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DECEMBER 1982

75P



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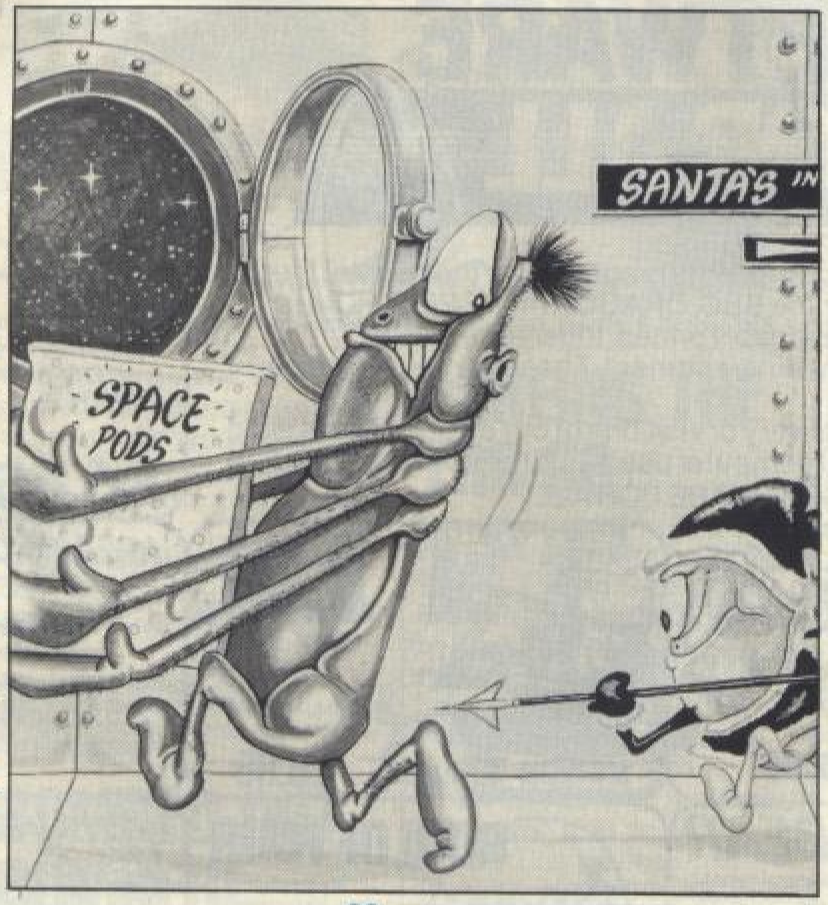


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COMPUTER & VIDEO GAMES

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DECEMBER 1982 No. 14



Bright Sparks . . .

Electronic toys and games are already eating their way into the prime commercial TV time slots in anticipation of a bleeping burping bumper Christmas.

From radio-controlled wonder cars to an abundance of games-playing time pieces, we take a buyers' look at how to approach this booming market. What to watch out for, what prices you should shop around to get and some of the best buys in each category.

Read it before you plan your stocking fillers this Christmas. It starts on page 85.

Also included in our Christmas Stocking section is a run-down of the chess machines you could buy this Christmas. How they compare with each-other and with the chess programs you could buy for a home computer.

News & Reviews

Listings







Features

Editor Terry Pratt, **Staff Writer** Eugene Lacey, **Editorial assistant** Susan Cameron, **Designer:** Linda Freeman **Production editor** Tim Metcalfe,
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Cover: John Thompson. **Next issue:** December 16th



Please drop us a line at: Computer and Video Games, EMAP, Durrant House, 8 Herbal Hill, London EC1R 5JB.

TONIC FOR THE TROOPS

Dear Sir,
I am at present serving in the Falkland Islands, working out of Port Stanley.

We are trying to get a computer club started in the evenings to try and eliminate some of the boredom of off-duty hours. At present we have limited facilities — 2 ZX81 Sinclair computers — and no recognised instructors.

Could I therefore ask you for some back issues of your magazine to assist us with our club, plus any other information/leads that may be of use to us?

S/Sgt Brown
30 FD SQN R.E.
BFPO 666

Editor's reply: Those back numbers are at this moment winging their way to you SSGT Brown. We hope they'll be useful in setting up your club.

ADVENTURER NEEDS HELP!

Dear Sir,
I would like you to print this letter because if so it will — hopefully — provide me with an answer to a question that has been niggling me for months. It concerns the game Ulysses and the Golden Fleece produced by On-Line Systems.

So far, for three frustrating months I have been plodding around the opening scenario without proceeding on to the second stage. I have tried everything, wandered round the forest for the day, pounding the shopkeeper with questions, threatening the guards with death — mine! — and still have not got into see the King.

So please, please, I beg, any Apple owner out there with the game and who have passed the first stage, please write into *Computer and Video Games* as soon as possible. Thank you! I wait eagerly.

Keep the Apple games coming — Imphotep and Alien Lemmings were excellent.

Michael Tallent,
Langport,
Somerset.

BOMBED OUT BOMBER!

Dear Sir,
I have just received the September issue of *Computer and Video Games* and I have typed into my 32K Atari 800 the program called Bomber only to find that it did not run. The program has been written or converted in such a way that it will only run on a 16K Atari.

I have converted it so it will run on any memory size Atari. First add lines
0 GRAPHICS 0 :REM CLEAR SCREEN.
8 DL = PEEK(560) + 256*PEEK(561) :REM (Find number of top left screen location. This varies with different sizes of memory).

Then change lines 10, 70, 80, 130, 190, 250, 310, 440, 450, 500, 560, 630, 690, 910 and 1030.

In these lines you will find the numbers, 15745, 15764, 15923, 15943, 15965, 15983, 16003, 16183, 16205. Change these numbers to: 15745 TO DL+353, 15764 TO DL+372, 15923 TO DL+531, 15943 TO DL+551, 15965 TO DL+573, 15983 TO DL+591, 16003 TO DL+611, 16183 TO DL+791, 16205 TO DL+813.

G. A. Ferguson,
Darlington,
County Durham.

POKEING THE TRS-80 . . .

Dear Sir,
Here are some pokes for the TRS-80. I found them in the *Basic Programmers Notebook* by Earl R. Savage.
POKE 16396,23 — disables break key.
POKE 16396,201 — enables break key.
POKE 16396,165 — replaces break with shift break.
Bypass 1 for printer.
10 POKE 16422,67:POKE 16423,0.
Line 10 causes the TRS-80 to automatically bypass all the statements which address the printer.
Bypass 2 for printer 20 POKE 16414,141:POKE 16415,5.
Line 100 is the screen bypass.
Line 200 resets line 100.
200 POKE 16414, 88:POKE 16415, 4
The book has many more 'tricks' for the TRS-80, I recommend it.

Sunil Parekh,
Eccles,
Manchester.

PLEASE, LET'S STAY SHARP

Dear Sir,
I have become rather disturbed of late by what seems to me to be a running down of interest in the Sharp MZ-80K both in advertising and articles on this splendid machine.

You have featured the MZ-80K in the Hardcore section, but really this is preaching to the converted and is of no use to someone who is already an owner.

I wonder it any of your readers would be able to supply games converted from another format? I am particularly interested in the 747 Simulator, which is only available for TRS-80 -Genie owners.

In conclusion, I realise that you cannot provide listings for every machine every month, but it does seem that a lot of space is taken up with new machines i.e. Spectrum and BBC etc and no doubt we will be flooded with Dragon articles. Please remember that there are specific mags for these machines, and people such as myself depend on you, in the absence of a Sharp Users magazine.

J. D. Carson,
Lurgan,
Co. Armagh

Editor's reply: You are in luck Mr Carson, a letter came into our office the other day from a group of people who are considering starting up a Sharp users magazine. The subscription rate would be between £4 to £6 and the magazine would be bi-monthly. The person to contact is Mr J. P. Griffiths, 104 Waterloo Road, Southport, Merseyside. And may we respectfully remind you that some of the best games we have published — for instance World Cup Manager — have been written for the Sharp.



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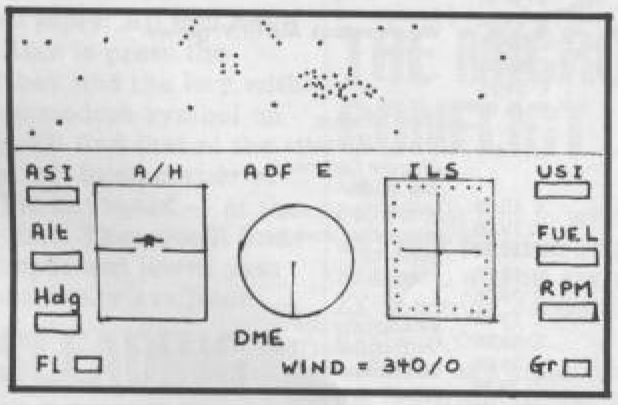
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MAILBAG



RATTLE AND ROLL!

Dear Sir,
A simple technique for gamesters and their ZX81's — add to the effect of an explosion to produce results similiar to an earthquake scene on TV — the jolted camera shot — get it?

By POKEing location 16424 you can cause the picture to judder in an alarming way — the higher the value the more alarming it gets — my program demonstrates this.

```
10 PRINT AT 10,10; "—— □□ ——"
20 FOR N = 50 to 0 STEP — 5
30 POKE 16424,N
40 POKE 16424, (50 — N)
50 NEXT N
60 GOTO 10
```

D. Beighton,
Silchester,
Reading.

CHARACTER PROBLEMS

Dear Sir,
Could you please tell me how you get lower case characters printed on the television screen using a Vic-20. I have tried desperately but to no avail.
Alan Clarkson,
Warrington,
Cheshire.

Editor's reply: All you have to do Alan is press the SHIFT key and the key with the Commodore symbol on it — you'll find that at the bottom left-hand corner of your Vic keyboard — at the same time. Then you'll find both upper and lower case characters are available.

MISLEADING MEMORIES

Dear Sir,
I wonder if any of your correspondents or staff have been slightly misled, as I was, by some advertisements for microcomputers, as far as the available RAM is concerned. I purchased my Atom as much for its expansion possibilities as anything else, but I also felt that 2K of RAM was a fairly generous offering for starters.

I soon discovered that 1K of that RAM is in zero page and dedicated to the operating system, except for a few odd bytes. Another ½K is the screen memory, leaving just ½K for program text! Even with the Atom's fairly compact abbreviations fitting a reasonable game into 512 bytes is rather frustrating. I now have a full expansion for the lower text space, but for several months the frequent appearance of ERROR 248 was a cause of much tearing of hair and gnashing of teeth!

I wonder, when I see adverts for some of the latest machines, such as the Spectrum (48K) or the Dragon (32K), just how much of that RAM is directly available to the user for program text. Perhaps your Hardcore article could publish a comparative table sometime.
Richard Gledhill,
Bicester,
Oxfordshire.



THE MICRO CONFLICT . . .

Dear Sir,
I felt I just had to write to you and your fantastic magazine, and have a short say in the ZX Spectrum versus the BBC model A conflict.

As far as I am concerned, the Spectrum is one of the greatest achievements in the computing industry. If I were to give you about £350 and also the choice of buying a BBC model A micro at £300 or a 48K Spectrum, costing a mere £175, a ZX microdrive at £50, a ZX printer at £60, an RS232 at only £20 and if you wanted a proper keyboard at about £40, which would you take?

I think the choice is obvious and I *know* that if I had £300 to spend on any computer, the Spectrum would be first on my list.

Finally, it is my belief that Sinclair make the world's best computers, and ITV make the world's best television programmes!

I would be grateful if you would publish this letter with the hope of clearing a few minds of the endless quibble between the Spectrum and BBC computers.
Alan McAuley,
Carrickfergus,
Co. Antrim.

VIDEO FAN SPEAKS OUT

Dear Sir,
Since finding your magazine in my local W. H. Smiths back in November last year, I have been buying it regularly every month.

Computer and Video Games fills a unique spot amongst all the computer-related magazines, dealing more with the fun side of computers, than boring us with the latest technical guff, which most of the others do.

I don't in fact own a computer as such, but am the proud owner of an Atari, VCS, and find your Video Screens reviews very interesting.

One request, how about doing a complete run down on the Atari VCS?, as I feel sure there are many VCS owners who don't really know much about the history or technical side of the VCS and would like to.
Mark Gentry,
Ipswich,
Suffolk.

SPECTRUM SPECIFICS

Dear Sir,
Having read a lot about the Spectrum several questions still remain in my mind.

Does the screen still flash when the 'Pause' command is used?

When saving and loading a program is the screen display retained or does it behave in the same way as that of the ZX81?

On Sinclair's order form both a "User-defineable character set and "User-defineable graphic characters" are mentioned. What is the difference?

When a sound is generated does the program stop until the sound has finished? And finally is it possible to set up files on cassette?
Jason Orbaum,
Surrey.

Editor's Reply: No Jason, the screen does not flash when the Pause command is used. The screen contents are retained when saving and loading, and there is no difference between the "characters" mentioned in Sinclair's publicity. A program does not stop when sound is used, but it will slow slightly, and yes, it is possible to set up files.

REVIEWERS REVIEWED

Dear Sir,
I have just received my Dragon 32 computer and would like to offer my services for reviewing games for this machine.
Paul Whitby,
Gloucester.

Editor's reply: We are still short of reviewers for the Dragon 32 and Texas 99/4A computers. If there's anyone out there who has a printer with their computer please write to us.

IT'S DRIVING YOU WILD

Dear Sir,
I noticed in your November issue that some people were having difficulty with Wild Strawberries. If they are trying to load it from disc they will experience some problems as some of the POKE commands disrupt the game.

The lines to be changed are: 65 where POKE 10240 + A should read POKE 38912 + A. The same change should be made for line 70. 75 should be changed to make POKE 10448 + A read POKE 39210 + A. 100 should be changed to make POKE 756,40 read POKE 756,152.
Philip Sadler,
Acton.

GAME OF THE YEAR WINNER

Those ravenous little devils, the Nibblers, which appeared in the very first issue of *Computer & Video Games*, have finally done some good.

They have won their inventor, Paul Jay, a trip to Paris for two, complete with spending money, courtesy of *Computer & Video Games*.

After careful consideration and much heart-searching by our panel of judges, Paul's Nibblers was voted the winner of our first Games Program of the Year competition.

Nibblers won because it was a simple but original idea, which included different levels of difficulty, sound and graphics. It ran smoothly and proved easy to key-in but compulsive to play.

So congratulations to Paul and commiserations to all those of you who held out high hopes of Paris in the Autumn.

And for those of you who have not yet had a chance to meet The Nibblers, we will be printing a Vic-20 listing we received which was converted from Paul's game.

Congratulations to all you masterminds out there who solved our first Puzzling challenge from the November issue.

But judging from the many phonecalls we received about Puzzle C we may have been too clever.

We changed one of the pages in Puzzle C to make it impossible and this obviously confused some of you, but most managed to come up with the right answer.

The correct solutions were — reading from the bottom of the page up:

A) Red, Red, Yellow, Yellow.
B) White, Green, Black, Red.
C) Impossible.
D) Red, White, White, Black.

The three winners will be announced next month.

THE EMPIRE STRIKES OUT

The Seventh Empire is a unique game and competition which will be starting in *C&VG's* February issue. It is a computer moderated game specially designed for *C&VG* by Mike Singleton.

Every player will control one of the galaxy's many tribes with seven space fleets to despatch around the star systems taking part in the empire battles for a share in the spoils, initiating your own raids and acts of piracy.

It will accommodate from 1 to 10,000 players with a winner being the player with the most points scored each month. Top scorer in the first month's game will win a Colour Genie Computer.

The first 1,000 readers we hear from will enter free, the rest will be asked to pay a token 50p charge but after that first turn, Seven Empires will only cost you a stamp every month.

Fill in the form below and rush it to: The Seventh Empire, *Computer & Video Games*, 8, Herbal Hill, London EC1R 5JB. Although you can enter the game any time, you will need to be on our records before the February issue goes to press in order to enter that first month. See page 72 for the background to the game, the rules come next month.

Please include me in The Seventh Empire competition which will run in your February issue.
The name of the tribe I wish to control is:
My name is ....
Address: ....
....
.... **Tel:** ....

COMPETITION COMPETITION COMPETI

NEXT MONTH

Take to the War Path in the new year with wargames author Ron Potkin.

Ron was the writer of our April issue star game, Kriegspiel, a chance to take your computer's Panzer divisions in a tank battle scenario.

War Path has a Wild West theme which gives the Indians every chance to reverse history. It also maps out Ron's unique Big Screen approach to computer war-gaming.

Instead of printing out the listing for one machine, Ron will be taking you through each part of the program, month by month, explaining how the Big Screen technique works and showing how it can be utilised on many different computers.

War Path kicks off our new year and provides some marvellous lessons in making the most of computer memory and TV screens.

The Seventh Empire rules are printed in the January issue. So all you budding fleet commanders should pick up a copy to find out how to partake in galactic warfare, make piracy work for you and play-off one warring empire against another.

The latest news from the *C&VG* special Starweb game comes from one of the more threatening of the galactic races, the dreaded Gzinti berserkers.

Mark Woolwich who has been following the growth of the Gzinti empire closely managed to intercept the following transmission on its way to their home world of Gzin.

The rate of expansion mentioned in previous reports has slowed greatly due to conflicts with other races on the thrice removed frontiers.

The powerful and hostile Pirate 1 is being kept out of Gzinti territory. His scout fleets are detroyed by our border fleets who are taking minimal damage.

Artifact Collector 1 has proved to be non-hostile and information received from him concerning Pirate 2 has resulted in our strengthening of the border between Gzin and Pirate 2. Furthermore a large force has been mobilized with the intent of destroying Pirate 2.

Artifact Collector 2, after being initially hostile, has retreated, as large force is pursuing him with the aim of neutralizing his threat. A time and labour-consuming job, but vital to ensure continued expansion and replacement of lost ships.

The fleet drawn into the black hole has remained silent and must be considered lost. However, the black hole provides a barrier to attack from regions beyond it.

The prime directive is never forgotten, non-robot population is destroyed wherever ships can be spared, though the needs for our survival and supremacy often conflict with it.

End of report.

The Gzinti Fleet Controller

spectrum

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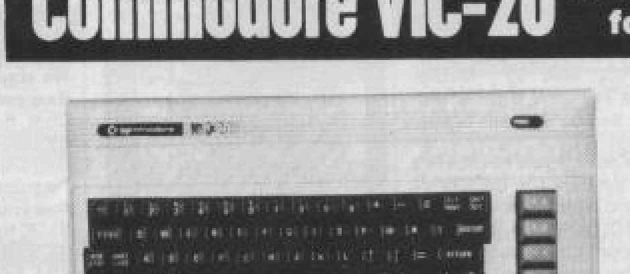
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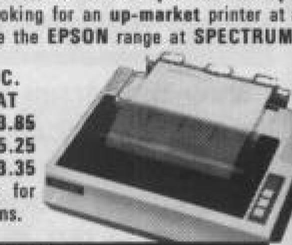
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All KUMA prices excluding V.A.T.

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GAMES NEWS

ALIENS WILL GIVE YOU THE SHAKES

KAMIKAZE ALIENS

Aliens are zooming down towards planet Earth with suicidal determination. They will crash into your ship — killing themselves and taking you with them without a pause for thought.

These kamikaze aliens are launched from the mother ship which zaps back and forth across the top of the screen sending a deadly rain of little green men down at your defences.

Shoot fast to stay alive in this new Vic game from Audiogenic. The game is obtainable from the Reading-based firm at £7.99.

Another new space theme game from Audiogenic this month is Satellites and Meteorites.

You are the commander of a meteorite destroyer ship on a mission to neutralise a storm of meteorites that are threatening your planet.

The only way to destroy the giant rocks is to blast them with your lasers — dodging the ones you cannot get in your sights.

Your mission is made more difficult by a squadron of enemy satellites which fly in after the meteorites.

If you survive the meteorites and the satellites you must then avoid the black hole to complete your mission.

Satellites and Meteorites is a cartridge game and plugs into the back of your Vic. Available at £24.99.

THE HAPPY EATER IS STILL BITING

GOBBLEMAN

Gobbleman, Munchman, Munchyman, Snapper — even Munch 'n' Crunch. Come on guys — let's have some more original names for Pacman style games! Better still let's have some original and exciting new games.

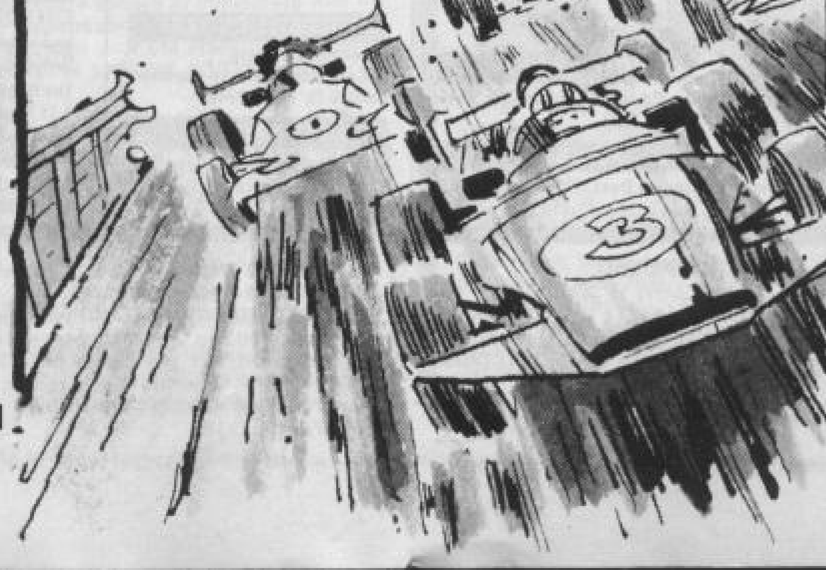
Illustrations: Jon Davis



Meanwhile, back in the maze, the ghosts and the little yellow disk with the insatiable appetite are running around the circuits of the Sinclair Spectrum. Gobbleman is fairly close to the arcade version although it does not feature the cage at the centre of the maze.

The game is the latest addition to the Artic computing range of games for the Spectrum. It is available from the Hull-based firm at £4.95.

The range also includes a high resolution graphics version of Space Invaders at £4.95 and a Chess tape with seven levels of play at £9.95. All games will run on the 16K or 48K Spectrum.



THEY CAME FROM THE ARCADES . . .

ARCADIANS

Two new games based closely on arcade money-spinners Asteroids and Galaxians are the latest offerings from Acornsoft for the BBC Model B.

Arcadians — the Galaxians clone — looks almost identical to the arcade version and, if its anything like Acornsoft Defender it will play as well as the arcade version too.

The Asteroids type game is called Meteors and again is a close copy of the arcade version with the added improvement of colour.

The games are available from Cambridge-based Acornsoft at £9.95.

AXE MAN MEETS THE MONSTERS

ESCAPE

Escape is the name of the game in a 3D maze full of prehistoric monsters.

In order to escape from the maze you must first find an axe that is hidden somewhere in the maze. You need this to get through the blue door to freedom.

The monsters track you at half your speed until you find the axe. This heavy weapon slows you down considerably and you may need to drop it in order to make a quick get away before you get through the blue door.

There are five different skill levels in this game — these change the number of monsters chasing you. It is also possible to alter the speed of the monsters.

Escape runs on a 16K Sinclair Spectrum and is available from Bristol-based New Generation Software at £4.95.

THE GAME OF MANY WORDS . . .

SCRABBLE

Scrabble fans will welcome this computerised version of the popular word-making board game.

The game is exactly like the board game except you must pit your wits against the computer. There are four skill levels — from easy to downright impossible and the computer keeps the score.

Scrabble runs off a disc for the 48K Apple and costs £24.95 from London-based Little Genius.

CHAMP OR CHUMP ON THE TRACK?

CARS

Bring the thrills and spills of the grand prix track to the keyboard of your Sharp MZ-80K.

You could become a world champ in Cars, the latest racing game for this computer.

Nine gears help you to accelerate around the twists and turns of the race track.

But its not only acceleration you'll need if you want to pop the champagne at the end of this race though. You must have quick reactions to steer in and out of all the other racers.

Cars is the latest game from Sharpsoft for the MZ-80K. It is available at £5.00 from the London-based company.

GAMES NEWS

HEN-PECKED HERO IS ON THE RUN!

MAD MARTHA

Poor little Henry is the hen pecked hero of this domestic tale.

One night Henry can take no more. He steals his wages from his wife's purse, sneaks out of the house being careful not to wake the baby or trip over the cat, and heads for the bright lights to have some fun.

Trouble is he runs out of money. His only way to raise some cash is to gamble his few remaining pounds on the spinning wheel of the roulette table.

Just as Henry is getting into his evening at the tables his wife — Mad Martha — has noticed his absence. Realising Henry has absconded with the housekeeping she sets out after him with an axe.

Guess what part you play in this happy little tale? That's right, you are Henry. Watch out for that axe!

Mad Martha runs on a Sinclair Spectrum or ZX81 in 16K and costs £5.95 from Swansea based Saturnsoft.

Also new from Saturnsoft this month are two adventure games for the Spectrum or the ZX81.

Mines of Saturn challenges you to find the hidden crystal mines and then escape with the goodies. If you succeed, then you are ready for a stiffer challenge — to find your way safely back to planet Earth.

Mines of Saturn and Return to Earth are available from the Swansea-based firm at £4.95 for the ZX81 versions and £5.95 for the Spectrum — with a pound off if you purchase both games.



MEANWHILE OUT IN DEEP DARK SPACE

SPACE PHREEKS

Space Phreeks challenge you to fight them as you journey through space — a lonely traveller in time, the last survivor of a once proud planet called Earth — now just a cloud of cosmic dust floating in the space winds.

Your space ship moves right and left across the bottom of the screen as assorted aliens swarm towards you — some of them firing missiles as they approach.

Space Phreeks runs on the expanded Vic and costs £9.99 from Harrow based Rabit Software.

Another new game from Rabit this month is a version of the popular arcade game Centipedes. It features the spiders, beatles, bugs, and mushroom field just like the arcade version.

You must also be careful of the 'Gobblers' which travel along the bottom of the screen. Remember you cannot shoot them — you have to dodge them.

The game also runs on the expanded Vic and requires joysticks to play. This also retails at £9.99.

The third game from Rabit this month is a version of the arcade game Frogger — again running on the expanded Vic at £9.99.

IT SHOULDN'T HAPPEN TO A BRICKIE!

FRENZY

Swing that hod of bricks onto your shoulders and set off up the ladder to the next row of scaffolding.

This is your chance to be a big butch bricklayer for the afternoon — flexing your muscles, swearing like a trooper, and whistling at the girls.

All you have to do is carry the bricks to the next level. But watch out, this is no ordinary building site and there are two monsters stalking the scaffolding — hungry to get their teeth into any passing hunks of beefcake.

If you successfully deliver your hod of bricks and manage to avoid the monsters you go on to a new more difficult level of play. This time there are two, and then four, and then six monsters.

Frenzy runs on a Tandy Model I and III and on a Video Genie I and II. The game can be obtained from East Sussex based Molimerx at £9.78 inclusive.

GUNNING FOR ALL THOSE TOP NAMES

PESTEROIDS

Do you think your computer is better than any other computer on the market? Or do you have a pet hate — a computer that has behaved badly?

Either way this game offers you the chance to blast the company logos of a selection of rival computer manufacturers.

They are all out there — waiting to be gunned down. From Apple to IBM you can take pot shots at them all. The game is based on the arcade game Asteroids and features the familiar command ships and hyperspace associated with this game.

PS Pesteroids runs on the TI 99/4a and is the latest game from Stainless Software of Stockport. The game is available at £9.00.

Also new from Stainless this month are two adventure games — Octal 1 and Keys to the Castle — on offer at £9 for both. Separately they cost £4 for Octal 1 and £7 for Keys to the Castle.

Illustrations: Jon Davis



MICHAEL ORWIN'S ZX81 CASSETTES

The best software (by various authors) at low prices

QUOTES

"Michael Orwin's £5 Cassette Two is very good value. It contains 10 stolid well designed games which work, offer plenty of variety and choice, and are fun."
from the ZX Software review in Your Computer, May '82 issue.

"I had your Invaders-React cassette . . . I was delighted with this first cassette."
P. Rubython, London NW10

"I have been intending to write to you for some days to say how much I enjoy the games on 'Cassette One' which you supplied me with earlier this month."
E. H. London SW4

". . . I previously bought your Cassette One and consider it to be good value for money!"
Richard Ross-Langley, Managing Director, Mine of Information Ltd.

CASSETTE 1

(eleven 1k programs)

machine code:
React, Invaders, Phantom aliens, Maze of death, Planet lander, Bouncing letters, Bug splat.
Basic:
IChing, Mastermind, Robots, Basic Hangman.
PLUS Large screen versions of Invaders and Maze of Death, ready for when you get 16k.
Cassette 1 costs £3.80

CASSETTE 2

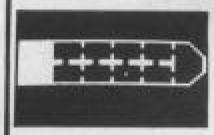
Ten games in Basic for 16k ZX81

Cassette Two contains Reversi, Awari, Laser Bases, Word Mastermind, Rectangles, Crash, Roulette, Pontoon, Penny Shoot and Gun Command.
Cassette 2 costs £5.

CASSETTE 3

8 programs for 16k ZX81

STARSHIP TROJAN



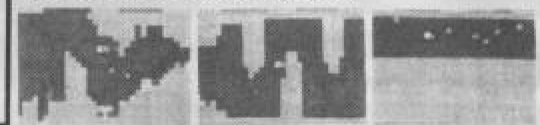
Repair your Starship before disaster strikes. Hazards include asphyxiation, radiation, escaped biological specimens and plunging into a Supernova.

STARTREK This version of the well known space adventure game features variable Klingon mobility, and graphic photo torpedo tracking.
PRINCESS OF KRAAL
An adventure game.
BATTLE Strategy game for 1 to 4 players.
KALABRIASZ World's silliest card game, full of pointless complicated rules.
CUBE Rubik Cube simulator, with lots of functions including 'Backstep'.
SECRET MESSAGES This message coding program is very txlp qexi jf.
MARTIAN CRICKET A simple but addictive game (totally unlike Earth cricket) in machine code. The speed is variable, and its top speed is very fast.
Cassette 3 costs £5.

CASSETTE 4

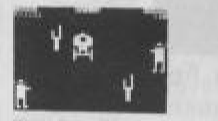
8 games for 16k

ZX-SCRAMBLE (machine code)

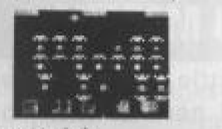


Bomb and shoot your way through the fortified caves.

GUNFIGHT (machine code)



INVADERS (machine code)



FUNGALOIDS (machine code)
GALAXY INVADERS (machine code)
Fleets of swooping and diving alien craft.
SNAKEBITE (machine code)
Eat the snake before it eats you. Variable speed (very fast at top speed)
LIFE (machine code)
A ZX81 version of the well known game.
3D TIC-TAC-TOE (Basic)
Played on a 4×4×4 board, this is a game for the brain. It is very hard to beat the computer at it.
7 of the 8 games are in machine code, because this is much faster than Basic. (Some of these games were previously available from J. Steadman).

Cassette 4 costs £5.

SPECTRUM SOFTWARE WANTED

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Michael Orwin, 26 Brownlow Rd., Willesden, London NW10 9QL (mail order only please)

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inc Basic	inc Basic

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Vic Disk Drive New Reduced Price	**£299.95**

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Atari 800 48K	**£569.00**

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GAMES NEWS

THIS GAME WILL SLAY YOU!

DRAGON QUEST



Seek out the dragon and slay it. This is your task in a new Adventure game based on the popular fantasy game Demons and Dragons.

The game displays text and graphics and challenges you to gain a thousand points before you can go on to level two. The authors of the program are confident that level one will keep you occupied for quite some time. So confident in fact that level two is not yet on sale.

Dragon Quest runs on a BBC model B and costs £11.50 from the Merseyside software house Bug Byte.

Also new from Bug Byte this month is a fruit machine game with many of the features of the old end-of-the-pier favourite. The game features spinning wheels with all the fruits and hold and nudge features. A torrent of pennies are depicted tumbling from the front of the machine when you get a winning line.

Fruit Machine runs on a BBC model B and is available at £5.50 from the Liverpool firm.

BATTLE TO REACH THE FORTRESS

SCRAMBLE

Hover above the missiles and bomb the fuel dumps. Sounds familiar — yes, you guessed it, it's another version of the arcade winner — Scramble.

This latest version on the Sinclair Spectrum in 16K or 48K and features four levels of play.

First there are the ground-to-air missiles, followed by the spiraling UFOs, and then the fast and furious meteorites.

If you survive this onslaught you can go on to attack the Fortress.

If you successfully destroy the enemy fortress the game starts again at a new more difficult skill level.

Scramble is the first Spectrum game from the Berkshire-based software house — Mikro-Gen. It costs £5.50 plus 40p postage and packing.

PIMANIA



A Fleet Street style bonanza of cash prize incentives is being offered by some up and coming games manufacturers.

Automata of Hampshire set the ball rolling with their Pimania game. The game owes a lot to the successful Kit Williams book *Masquerade*.

Unlike the jewelled hare of *Masquerade* the treasure is not buried secretly in the countryside but hidden metaphorically at a certain "time and place".

The prize for the lucky winner of Pimania is the Golden Sundial of Pi, an elaborate compass and sundial crafted in gold, diamonds, worth £6,000.

Not to be outdone Hull-based Artic Computing are offering £10,000 plus two tickets to the mystery city where the money is stashed away to the person who can solve their international finance adventure game — Krakit.

Is £10,000 the limit in prize money so far offered by the software houses? It seems so at the moment — but what's that rumour from Automata about a free trip around the world!

Pimania runs on a Sinclair Spectrum in 48K and on a ZX81 with versions in the pipeline for the BBC 32K, and Dragon 32K. The Spectrum version costs £10 and the ZX81 £8. The Dragon and BBC versions will be available for Christmas at £10.

Krakit also runs on a Spectrum and a ZX81 and is available at £9.95 for either version.

Illustration: Jon Davis. Photograph: Linda Freeman.

BEWARE THE DEADLY IMPOSTERS

MARTIANS

The Martians are invading. They rely on stealth and sheer numbers to overcome you.

Armed only with a force field you must attempt to catch them before they land. If you let six of them slip through your net you will be defeated.

Not all the Martians can be trapped in your force field. Destroyers can break through and will kill you if they make contact.

Imposters turn into destroyers at the last moment just as you are about the trap them.

Martians runs on a BBC model A or B and costs £5.95 plus VAT from Leeds-based Micropower.

Also new from Micropower this month are versions of the popular arcade games Missile Command and Galaxians. The games run on the BBC model B and are available at £6.95 plus VAT.

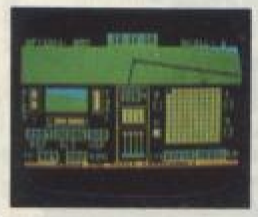
"We will be flying at a height of 30,000 feet.
Our air speed will be 500 knots.
And there's a fair chance we're going to crash."





No smoking. Fasten your seat belt. You're about to take off in a 747. But on this flight you're the pilot.

You could hardly describe THORN EMI's 'Jumbo Jet Pilot' as simply another video game. It's more like a session in a flight simulator with life-like instrumentation and graphics.



Jumbo Jet Pilot. 16 K ROM. Cartridge. 5 skill levels. Performance rating. Controls: Throttle. Ailerons. Elevators. Undercarriage. Brakes. Stall Indicator. Lights. Fuel. Longitude. Latitude. Air Speed. Artificial Horizon. Altitude. Pitch and Roll. Heading. Vertical Speed. Map Reference and Grid. Time Elapsed.

To cope you need to be alert. You should expect the unexpected. And you definitely shouldn't lower the undercarriage when your air speed is dropping and the horizon suddenly appears vertical!

On landing, your in-flight computer will assess your skills and give a 'performance rating'. If you manage to land that is.

'Jumbo Jet Pilot' is one of 21 challenging new home computer games from THORN EMI. It's pretty demanding. But our programs aren't all work and no play.

'River Rescue', 'Kickback', and 'Soccer,' are all-action games. 'Pool' and 'Darts' will suit armchair sportsmen.

And whilst budding Beethovens play the 'VIC Music Composer,' would-be Chancellors can work on their budgets with 'Home Financial Management'.



Darts.



Humpty Dumpty.

We also have educational puzzles for children that will puzzle adults at higher skill levels. But there's one simple idea behind all our titles; we've designed them for players who are bored with run-of-the-mill TV games.

Now, is that Heathrow ahead? Or is it Hyde Park?

THORN EMI VIDEO

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CHARMING ENCOUNTER WITH E.T.

E.T.

ET, the friendly Kermit the frog-like alien who is taking American cinemas by storm will soon be appearing in a brand new video game for the Atari VCS.

The game is still only in the production stage but is expected to be in the shops by Christmas together with a new upgraded baseball game.

The film opens in this country in November. It is Steven Spielberg's latest blockbuster. The 34 year-old director — already a millionaire with successes like Jaws, Close Encounters of the Third Kind, and Raiders of the Lost Ark under his belt — has hit on yet another winning formula.

E.T. is a friendly alien. He has no plans to colonise the universe, and has no lasers, death stars, or destroyer ships in tow. He befriends a little boy and is carried around in his new friend's cycle basket.

The idea of an odd, or friendly, or even helpless alien is not new. But this is the first time it has been given the full Hollywood treatment.

So what about the game? We will be publishing a full description and review as soon as the information is available from Atari — which should be in time for our next issue — watch out for it!



HOUNDED BY THE DOG CATCHER

CAT TRAX

Cat Trax is the first new Pacman type game I have seen since Mattell's Lock 'n' Chase to offer any real development of the basic theme.

In this version you can actually change the shape of the maze as the game is in progress.

A series of gates which can be closed to turn the maze into a single long passage can be opened and shut to trap the dogs that are chasing you around the maze.

You are a cat being pursued around a maze by three dogs. As you travel you eat up the dots which fill the maze until the maze has been cleared.

Every so often a fish will appear at the centre of the maze. If you eat this you will change into a dog collecting van which you drive around the maze in persuit of the dogs which can now be deposited in the kennel at the top of the maze. But you will have to be quick as you change back into a cat 30 seconds after eating the fish.

The game also features a warp button which enables you to disappear if the dogs are about to catch you and then reappear in a different part of the maze.

It runs on the Hanimex HMG5000.

Escape is the name of the game in this second new offering from Hanimex this month.

You are trapped in an electronic maze with highly charged walls which, if you touch them, the walls will electrocute you.

The aliens are after you. You must shoot them out of the way before you make a dash for the exit of the maze. There is also a deadly spinning dicky-bow shaped flying saucer which will take off and home in on you at any moment. This cannot be shot by your figure. Arcade veterans will recognise this as a version of the popular video favourite — Beserk.

The games are in the shops now at £16.

THE GAME OF THE FILM . . .

The list of memorabilia on sale in the wake of successful new films is becoming quite daunting. As well as the book, the record, the t-shirt and the badge, video games players will soon be able to purchase the game of the film.

Mattell were the first company to spot this potentially lucrative games market with two games for their Intellivision machine based on the new Walt Disney film Tron.

Atari themselves are about to enter the field with game versions of Stephen Spielberg's latest blockbusters Raiders of the Lost Ark and ET.

CAN YOU SOLVE THE DARK SECRET?

RIDDLE OF THE SPHINX

One of the darkest secrets of video gaming is the Riddle of the Sphinx.

This Atari VCS cartridge from the Imagic range is still to be solved by US gamers and should prove just as difficult for those in the UK.

This unique game which combines action with clue gathering is proving so difficult to beat we felt the first person to come up with an answer should be rewarded.

So in conjunction with Imagic's UK distributors, Hale's Limited, we are putting forward a prize for the first person to discover the secret of the Riddle of the Sphinx.

The winner will receive £185 worth of Imagic goods, courtesy of Hale's Limited. This includes the other six titles in the range planned for release over here: Demon Attack, the top-selling Trickshot, Atlantis, Star Voyager, Cosmic Arc and Fire Fighter. Plus a storage container for the Atari games centre and all its attendant wires which organises and 15 cartridges.

Reviewed in our November issue, Riddle of the Sphinx, sets you down in the Valley of Kings, among the pyramids, palm trees and temples of the desert, charged with the mission of collecting priceless treasures and artifacts.

If you solve the Riddle of the Sphinx, send a photograph of the screen to: Imagic Competition, Computer & Video Games, Durrant House, 8, Herbal Hill, London EC1R 5JB.

If you think you are getting close, then send us a letter to tell us of your discoveries so far. Good luck and may your camel's hoof never descend upon the scorpion's tail.



WORDS OF WISDOM FROM A B17!

TALKING GAMES

Does the game sound good? This is soon to become as important a consideration as playability and what a game looks like.

Leading the field in talking games so far are Mattel with two games for their Intellivision machine.

B17 Bomber takes you on a bombing trip over Berlin, Dresden, and Hamburg.

It's 1943 — a critical period in World War II. Your mission is to destroy the German war machine by knocking out factories, refineries, warships, airstrips, and anti-aircraft batteries.

The targets are not sitting ducks. You must avoid the barrage of flak exploding around you — and what's that the pilot just shouted?

"Bandits at 12 o'clock". You are now the gunner. The survival of the plane depends on your ability to blast away with the machine gun around and take out those Messerschmitts that are screaming down towards the great hulking target of the B17.

At the start of the game you pick your targets on a map of Western Europe which appears on the screen. Extra points are awarded for successfully bombing a target further from base.

But this is no place for the adventurer. All missions have to be carefully planned. You have to fly the plane, fire the guns, drop bombs, and do all the navigation with a constant eye on the altitude, fuel, speed, course, and the supply of bombs left.

The second talking game so far available from Mattel and featuring their voice synthesiser is Space Spartans.

You are at the cockpit of a Starfighter. Your computerised flight information controls talk to you as you prepare for battle.

The ship's computer reports on the status of all ship systems.

The Central Computer reports on the energy level and the number of aliens. An alert is sounded by the star base computer when the aliens attack your starbases. The alien commander tells you when the battle is over.

Mattel are developing more talking games. It has to be said however, that the games are not cheap. Space Spartans, and B17 Bomber for example cost £29.95.

The games require the Intellivoice sound synthesiser module. This plugs into the Intellivision centre's games socket. The module is in the shops now at £50.

IN THE JUNGLE SOMETHING STIRS

PITFALL HARRY

Pitfall Harry is the Tarzan of video games.

He is also your companion in a perilous journey through the jungle in search of treasure.

Harry's adventures include swinging over streams on ropes, hopping across a crocodile-infested river using the crocs' heads as stepping stones, avoiding avalanches of logs and sudden swamps.

Among the other deadly fauna are snakes and scorpions which lie in wait among the jungle foliage.

The screen shows a picture of the jungle with a dense covering of trees. At ground level is Harry, jumping logs and whatever other obstacles are in the game at any given time and below him an underground passage is connected to ground level by a ladder.

At the beginning of the game Harry drops out of the trees and can be made to run left or right with the joystick. He can also be made to climb up and down the ladder and jumps over the rolling logs and other obstacles by depressing the fire button on the joystick — just as in the popular arcade game Donkey Kong.

Successful Pitfall players — defined by the games manufacturers as 20,000 and over — will be invited to join the Pitfall Harry's Explorers Club.

Pitfall Harry runs on an Atari VCS and is the latest game in the Activision range available from late December and January at £24.95.

STOP THE SUITCASE SHAMBLES

LOST LUGGAGE

Lost Luggage tumbles from the revolving baggage dispenser as you — the unfortunate porter, struggle to pick them up.

The bags start coming faster and faster as you move the porter right, left and up and down with the joystick.

Lost Luggage is basically a catching game based on the popular Intellivision game Kaboom where the player had to catch bombs.

In this game it's not explosions you get if you make a bad catch but a red face as the contents of the bags spill out on the floor of the airport terminal.

The more you catch the more you score. The game requires speed and manoeuvrability to score really highly. Lost luggage is the latest addition to the Apollo range of games for the Atari VCS.

HERE'S OUR NEW TOP TEN . . .

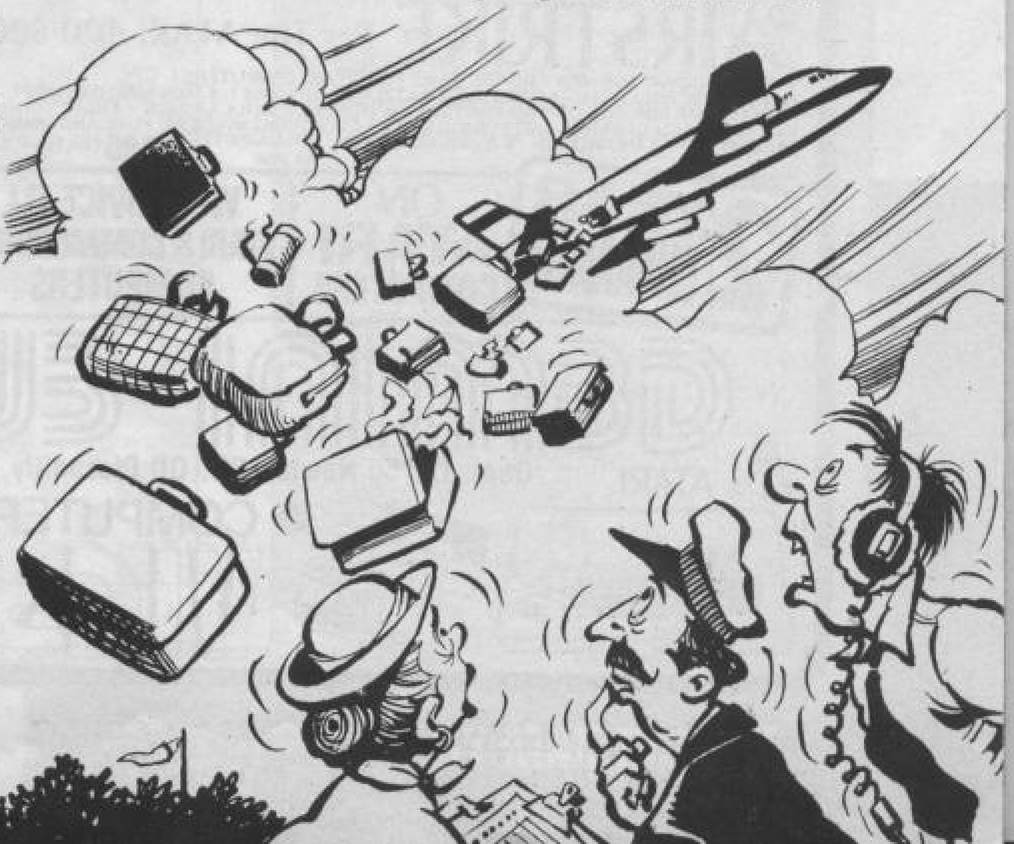
A new feature of Computer & Video Games will be a top ten chart featuring the best selling TV games centre cartridges over the previous month.

The figures come from retail outlets rather than distributers and the ones printed below feature the best selling cartridges over the whole range of machines for the month of September.

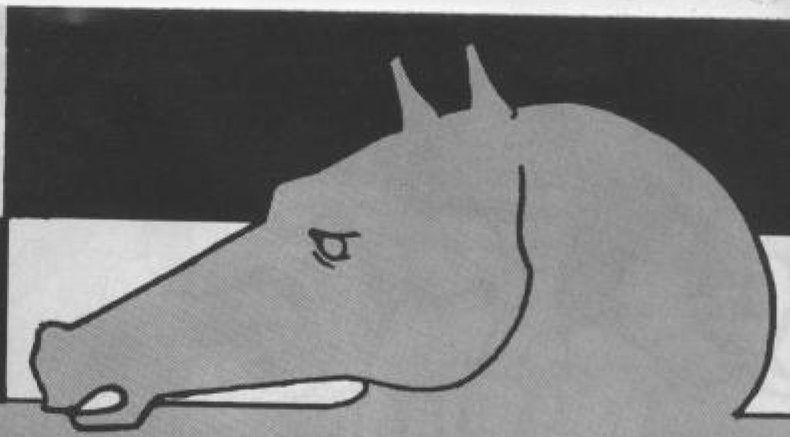
Mattel's new launches during that month have all sold well and assured that machine filling three of the top five positions. Atari's Defender takes the top spot though.

We will be checking on the best selling cartridges every month from now on.

CARTRIDGE	MANUFACTURER	MACHINE
1. Defender	Atari	Atari VCS
2. Lock and Chase	Mattel	Intellivision
3. Utopia	Mattel	Intellivision
4. Night Stalker	Mattel	Intellivision
5. Star Master	Activision	Atari VCS
6. Pacman	Atari	Atari VCS
7. Sub Hunt	Mattel	Intellivision
8. B17 Bomber	Mattel	Intellivision
9. Space Hunt	Mattel	Intellivision
10. Trickshot	Imagic	Atari VCS



CHESS



Endgame is the part of chess where precision is most important — one slip here can throw away the benefits of hard-won advantages and victories secured in the middle game.

Computers generally play endgames badly and yet it is endgame play which is widely believed to be the best mark of a good human player.

A well known example of King and Pawn against King (KPK) is in figure 1. White's only winning move is K-QB2, not K-Q2 or K-K2. Yet to discover this by searching involves looking ahead 27 ply.

If KPK is so difficult, it is hardly likely that a program would find the best move in a complicated endgame such as, King, Rook and two Pawns against King, Rook and three Pawns. How can the grandmasters' endgame knowledge be captured? An obvious approach is to turn to textbooks such as *Basic Chess Endings* by Reuben Fine.

To a precise reader, textbooks turn out to be full of errors, ambiguities and obscurities. The rules given are unvariably vaguely worded with numerous exceptions. Despite this there is the remarkable fact that textbooks are genuinely useful to the reader and in the case of endgames such as KPK seem to show how to play almost perfectly.

A possible explanation is that chess players have some "internal model" in terms of which a piece of advice such as, "develop Knights before Bishops" can be interpreted without its meaning being precisely specified.

For instance, "Knights before Bishops" is subordinate to "Do not lose your Queen for nothing" and this is considered too obvious to be worth stating.

Finding all such hidden exceptions to rules is difficult for the programmer but simple for the textbook reader to do. Often there is a conflict of objections. How does "advance the Pawn" rate relative to "take the opposition with your King"? People seem to resolve such conflicts without even noticing them.

The art of chess playing is often sacrificed on the alter of chess programming.

The usual way of writing chess programs is based on generating huge trees of variations and assigning each position a fairly crude numerical value. This is geared to what computers can do well rather than the special difficulties of the game itself.

Human players do not analyse tens of thousands of variations before making a move. As I showed last month, grandmasters do not analyse much more than ordinary mortals, but they are much better at recognising features of a position which suggest good moves.

Conventional chess programs have achieved surprising success in recent years, but to advance to grandmaster level may require building in expert knowledge as well as deep searching. Artificial intelligence (A.I.) researchers have devoted considerable effort in the last few years to identifying the form which expert knowledge might take. The restricted nature of endgames has made them a frequent vehicle for such research. Even elementary endgames such as King and Pawn against King are remarkably difficult to program in the usual way.

Fig 1.

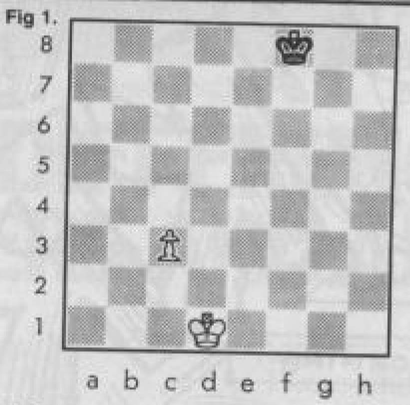
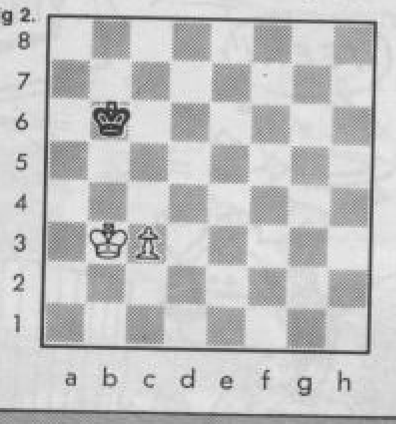


Fig 2.



One of the most important skills which humans exhibit is the ability to generalise from specific examples to a large number of equivalent positions while also recognising exceptions.

In figure 2, White's only winning move is K-N4. Giving this information to a human player immediately gives him a great deal of other information. For example, if the whole configuration of pieces were moved to the left or the right or up or down the board, the same White move (King one square forward) might well still be right (you might like to check whether this is really true).

And with the White King on N4 and the Pawn on B2 initially, the move P-B3 is also correct, since it transposes to the same winning position. K-N4 would still be the correct first move, even if White's King were on R3 or R4 instead of N3 in figure 2.

There are clearly many different situations represented by the one diagrammed example and the chess player can make this generalisation easily while appreciating that if the White King were on QB4 in Figure 2, K-N4 would 031noy be the correct move. Playing K-Q5 then gives a position which is more favourable than taking the opposition.

Given an endgame programming environment, which allowed one example position to stand for many, where unspoken objectives (such as "avoid losing material") were automatically included and priorities among goals were easily specified, it might indeed be possible to program the endgame by giving little more than the examples from a textbook.

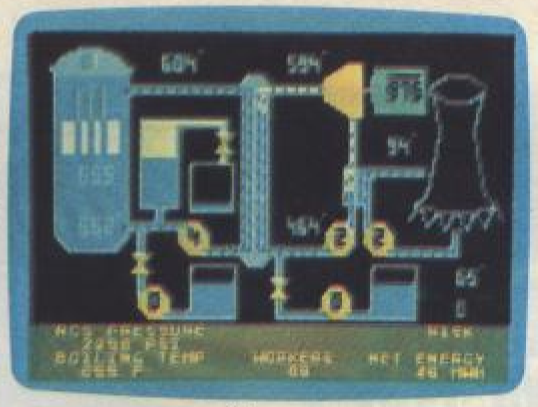
This sort of approach has been tried in different forms several times in the last few years. As an example of what benefits may be gained, it turns out that to program KPK for the stronger side to win in every winnable position requires only the specifying of 20 simple patterns, plus a suitable "environment", not the 38 ply search needed by a conventional approach.

BY MAX BRAMER


THE BUGS
SEE! I TOLD YOU!
IT'S CHRISTMAS EVE AND NOTHING IS STIRRING... NOT EVEN A BUG!
ULP!
TAP!
A COMMODORE PET! I KNEW HE WAS THINKING OF GETTING A NEW MICRO. BUT I NEVER THOUGHT HE'D LET OUR ONE GO SO SOON.
CO
PET
SOB!!!
WE'RE GOING TO BE ON THE SCRAP HEAP BEFORE YOU KNOW IT!
THIS CALLS FOR ACTION! GET SCREAMING FOUL-UP.
YOU UNDERSTAND NOW. I WANT YOU TO CLIMB IN THERE AND WRECK IT UTTERLY.......
..MAKE IT UNUSABLE!
GRAHH!
SNARL!
GNASH!
KRUNCH!
THE NEXT MORNING..
YEEK!
COLLIE DOG PET SHOP
!



Music Composer


Scram



Graph-it


Intro to BASIC 1


Star Raiders



European Countries


Missile Command



Basketball

3.7 million reasons why the Atari Home Computer is something to see. The display screen used with our computers is composed of 192 horizontal lines, each containing 320 dots. Delivering colour and luminosity instructions to each dot for a second requires 3.7 million cycles...a lot of work for the normal 6502 processor.

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TIPS ON GORF

A GAME FOR REAL MEN . . .



Gorf presents the player with five mini-games. The combination offers variety, but also makes the game tough since each portion has its own strategy. The game also barks out an insult at the player when he loses a man.

The first mission you face is Astro Battle. Invaders are dropped into place; they then begin moving and shooting.

When the Astro Battle invaders are being dropped into place, they cannot move or shoot. Kill as many as possible since you don't have to worry about moving targets or enemy fire.

Pay little attention to the shield. It will let your shot through and block enemy shots. But if you depend on the shield, you may be unpleasantly surprised.

As in Eliminator, a shot in Gorf will disappear if another one is fired. If you see a shot is going to hit a target, avoid the urge to fire another. But if a shot is a clear miss, fire again right away.

In Laser Battle, you must deal with two laser cannons protected by escorts. The cannons fire beams that extend from their ship to the bottom edge of the screen, forcing the player to avoid two shots at a time.

The laser cannons are the main threat. You should try to wipe them out early in the round. Don't get trapped between two shots. Also, watch out for the last shot of a dying cannon. Even after the cannon is gone, this shot will be lethal.

Avoid being drawn into cannon fire by the escort dive bombers, and take advantage of your ability to move in all directions when dealing with the escorts.

To deal with the Galaxians, get as close as possible, shoot, then pull the stick back until the shot hits. Repeat this technique, using rapid jerks of the joystick. Don't allow your ship to become trapped. Stay in the mid screen area, so you have a buffer zone.

The Space Warp mission has a black hole at the centre of the screen. This releases objects that fly an outward spiralling orbit. Since you can move upward, it is a good idea to get as close to the black hole as possible in the early part of the wave.

When the Gorfian robot appears, fire as many shots as possible. If you don't kill it fairly quickly, back away from the centre of the screen and wait until the robot has gone off the edge of the screen.

In the Flagship mission, you must fire a shot into the core of a ship. Your shots eat away parts of the ship, and at times cause chunks to fall off.

The shield offers no real help. Just blast a hole in the centre and fire through it.

When debris falls from the ship, you can either dodge it or shoot it for extra points. In tight situations, don't worry about the points.

The Gorf tips are taken from a chapter devoted to the game in a new US publication, *Guide to the Video Arcade Games.*

Twenty games are included with a description of the play and tips on how to achieve a good score. The tips are generally aimed at the beginner and more advanced players will have already progressed beyond the book's power to help.

The book is written by two young American gamers, David Lubar and Owen Linzmayer and is published by Creative Computing Press at a cost of £2.00.

IS IT A BIRD OR A PLANE?

FAST FREDDIE

Buy a hang-glider and see the world. That's the message in the high-flying arcade game, Fast Freddie.

Fast Freddie is a hang-glider with a yen for travel. His aim is to stay in the air as long as possible but he must use his skill to manipulate the invisible air currents, wind direction and the unpredictable up and down drafts.

Players us a joystick to control Fast Freddie as he soars over the wonders of the world. His flight takes in the Alps, both in winter and summer, the pyramids and sphinxes of Egypt, the Taj Mahal, the Pacific Ocean and a host of trees, bridges, tropical islands and other landscapes.

A series of obstacles can be found in the skies for Freddie to manoeuvre around. These include: aircraft, birds, helicopters and a magic flying carpet- complete with genie.

Ideally Freddie should fly above the obstacles and kick them out of the way.

Points are scored by swooping down close to earth and snatching flags which are posted along the ground. He can also grab special flags with letters on and spell out a "Bonus" for himself. Further points come for landing on five landing pads which can be found on the way.

WATCH OUT, THE WARRIOR IS ABOUT!

DARK WARRIOR

The aliens have landed and they are attacking by land and air!

In this encounter, which reads like something out of Star Wars, the Imperial Federation has landed its assault force on your planetoid and charged it with the mission of destroying your remaining fuel deposits.

While its aerial forces keep you busy, the Dark Warrior approaches from beyond the horizon, keeping low to outwit your laser guns. With each aerial task force which is destroyed, the Warrior sends in a new one to attack your laser base.

After two of the aerial forces have been destroyed, the deadly Neutron attack force, which is unerringly guided to destroy your laser blaster.

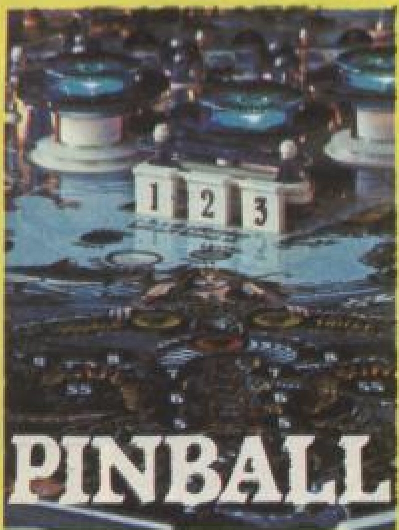
When the fuel runs low there is a verbal warning: "Beware the Dark Warrior is coming."

Dark Warrior is one of a range of eight cassette games which form the Century Video System (one of which, Outline, was featured last month). The cassettes are similar to those used in home computers and can be plugged into existing games cabinets to change the game. Other companies are also adopting similar systems.

So if you recognise a game as being on the Century system and would like to try one of the challenges described on these pages, them implore your arcade/pub manager to try and get it for you. We will continue to look through the Century range each month.



ACTION



It was a pinball player's paradise! The Pinball Owners' Association convention held recently in South London that is.

People flocked from all over the country to play and display their favourite tables.

Around 20 pins were on show and the convention also saw the battle for the coveted Pinball Wizard title.

Dave Dutton from Leeds claimed that honour after battling through to the final which was played on the latest Gottlieb machine, Rocky.

Among the machines on show were Magic City, a Williams machine from '67, Fireball, a Bally table reckoned by pinball addicts to be THE classic machine made in '72, and a Williams Flash.

The Pinball Owners' Association was born in 1976 and has grown rapidly. It offers a spares service, a technical library, a monthly magazine and invaluable advice for all pinball owners and players. Membership costs £7.50, and this includes a subscription to the magazine, called *Pinball Player and Penny Slot Collector,* plus all the other services the association offers.

If you are interested in pinball — or any amusement machines — further information, or membership, is available from the association's HQ at the following address: The Pinball Owners' Association, Arcadia, 465 Cranbrook Road, Ilford, Essex, IG2 6EW.

FRANK, DRAC & PICO!

MONSTER BASH

Only in films would a character called Little Pico dare take on the likes of Dracula, Frankenstein and the awesome Chameleon Man . . . only films and "X" rated arcade games.

Monster Bash is the name of this imaginative game of horrors which combines some of the aspects of Alien Panic, Donkey Kong and Pacman.

Little Pico is charged with the task of entering the castles of Frankenstein and Dracula and the graveyard of Chameleon Man and destroying each in turn.

The stairways of Dracula's house are guarded by bats but Pico has a "zap" power which he can use to shoot these creatures. Dracula is invulnerable to an ordinary zap and a charge of "super-zap" must be sought by Pico. He achieves this by lighting candles which energise a magic sword.

The candles also serve to make Dracula weak and when Pico touches the energised sword he earns a charge of superzap to try out on Dracula.

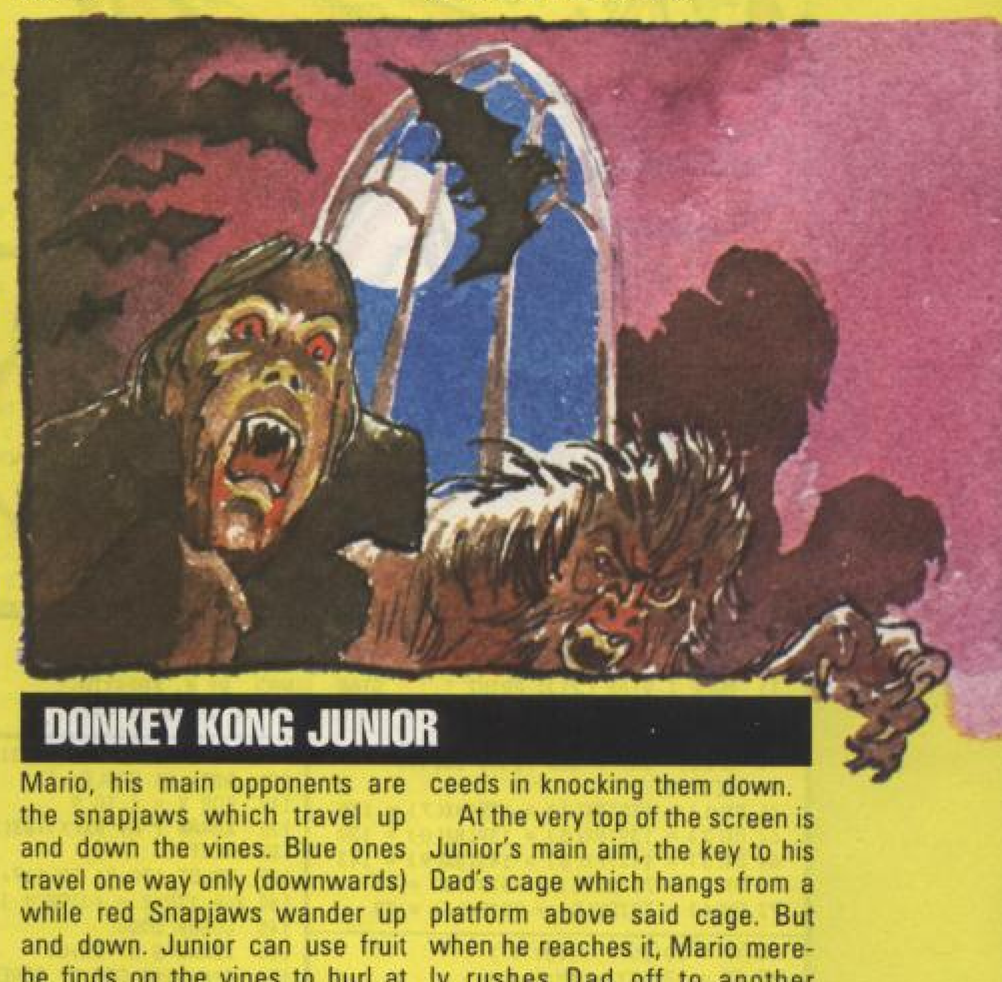
Frankenstein's castle is a similar type of challenge but with werewolves instead of bats.

The Chameleon Man has spiders as his pets and these are not affected by lit candles. He also has the power of changing colour to match his surroundings and Pico must make use of three colour buttons to keep this fiend visible.

The final power of Chameleon Man is his tongue which can reach out to ensnare Pico or soak-up superzap bolts.

A moon also features on the screen. It is Pico's timer, if it goes behind a cloud he knows his superzap power has dwindled and he will have to light more candles.

There are also such peculiarities as Warp Doors — which can only be used when they are lit — and Jump Down Zones for Monsters and Pico to use.



MONKEYING AROUND WITH MARIO

DONKEY KONG JUNIOR

It's a strange life in the arcades. One moment you're the hero and the next you're public enemy Number One.

Take poor Mario, the intrepid carpenter who risked all to save the captive girl in Donkey Kong.

In the game's sequel, Donkey Kong Junior, Mario is cast as the evil villain. He has captured Donkey Kong and holds him under lock and key in a cage at the top of the screen.

The rescue bid must be undertaken by Donkey Kong Junior.

Like its predecessor, the Junior version has four screens of action. The first screen is the one featured in this piece and it consists of vines which hang from a series of platforms, suspended in the sky. Junior starts his bid from five stepping stones which rise above a river.

Apart from the whip-holding Mario, his main opponents are the snapjaws which travel up and down the vines. Blue ones travel one way only (downwards) while red Snapjaws wander up and down. Junior can use fruit he finds on the vines to hurl at the pursuing Snapjaws and scores extra points when he succeeds in knocking them down.

At the very top of the screen is Junior's main aim, the key to his Dad's cage which hangs from a platform above said cage. But when he reaches it, Mario merely rushes Dad off to another cage, and another screen challenge.



" I DON'T LIKE OUR GOVERNOR'S SENSE OF HUMOUR..."

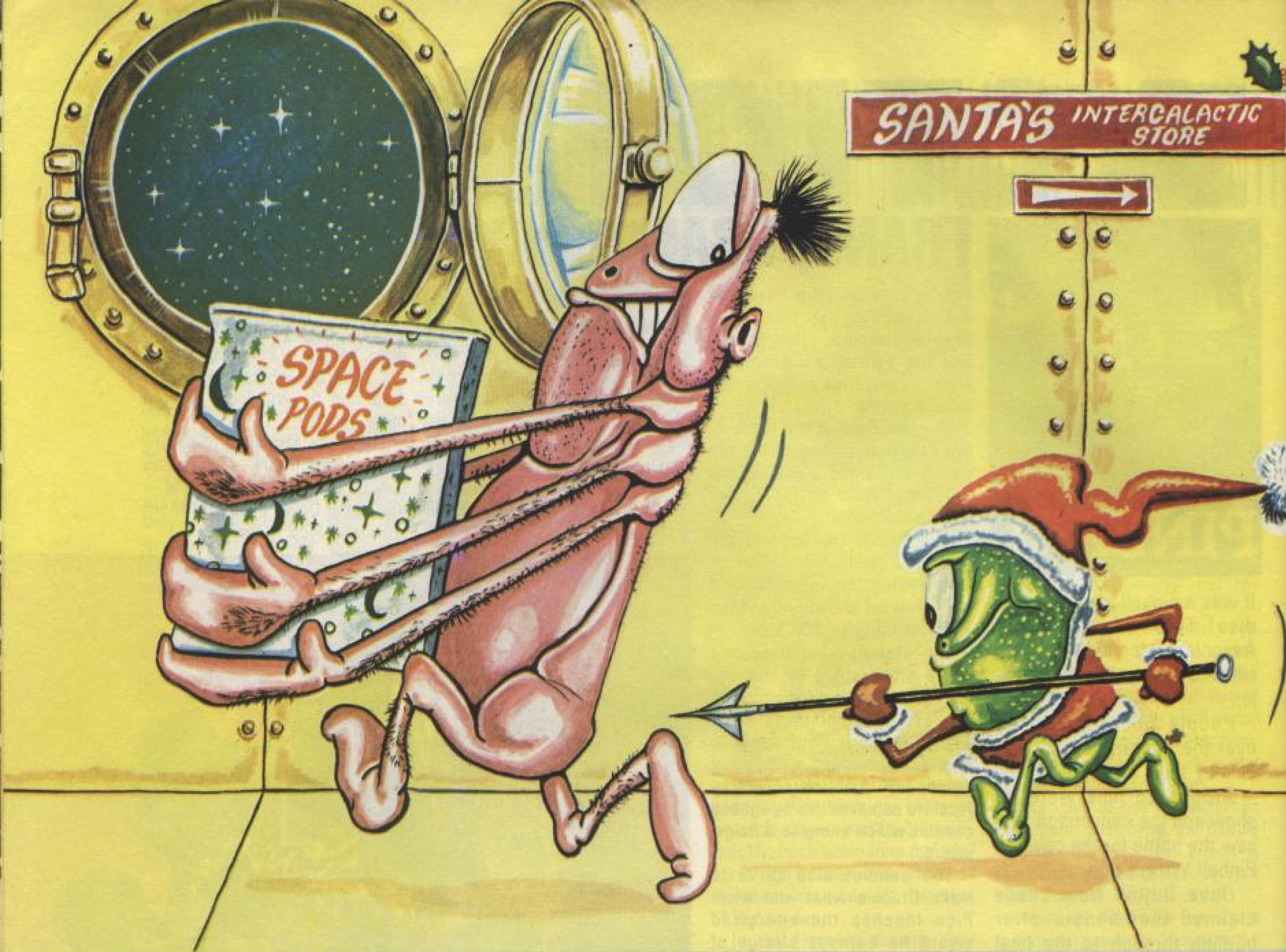


Illustration: Dorian Cross

```
5  HOME : GOSUB 6000: GOSUB 10000
10  HGR
15  HOME : VTAB (21): PRINT "     STAR  GUARD  BY N. FORSYTH."
20  HCOLOR= 7: HPLOT 0,0 TO 0,159 TO 279,159 TO 279,0 TO 0,0
30  FOR Y = 0 TO 159 STEP 3
40  HPLOT  INT ( RND (1) * 280),Y
50  NEXT Y
60 BX(1) = 135:BX(4) = 135:BX(7) = 135
62 BX(2) = 139:BX(5) = 139:BX(8) = 139
64 BX(3) = 143:BX(6) = 143:BX(9) = 143
70 BY(1) = 75:BY(2) = 75:BY(3) = 75
72 BY(4) = 79:BY(5) = 79:BY(6) = 79
74 BY(7) = 83:BY(8) = 83:BY(9) = 83
100  ROT= 0: SCALE= 1
110  FOR X = 1 TO 9
120  XDRAW 9 AT BX(X),BY(X)
130  NEXT
135  HPLOT 130,71 TO 147,71 TO 147,87 TO 130,87 TO 130,71
140 X = 139:Y = 40:OX = 139:OY = 40
145  GOSUB 5000
150  XDRAW 8 AT OX,OY
153  REM  ttt SET UP SCREEN ttt
154 L = 9:ST = 6000:S = 0
155 XV = 10:BV = 10:VY = 7
160 CX = 139:CY = 79:D = 1
165 AL = 1
181  IF S > 0 THEN 187
182  POKE  - 16368,0: FLASH : PRINT "        HIT ANY KEY TO START        ": NORMAL
184  WAIT  - 16384,128
185  HOME : VTAB (21): PRINT "               SCORE=";S
187  GOSUB 500
190  FOR T = 1 TO 100000
200 K =  PEEK ( - 16384)
205 Z =  FRE (0)
210  IF (K = 160) * (AF = 0) THEN  POKE  - 16368,0:SF = 1: GOSUB 700:SF = 0
220  IF K = 201 THEN YV =  - VY
230  IF K = 205 THEN YV = VY
240  IF (K = 202 AND XV > 0) OR (K = 203 AND XV < 0) THEN XV = XV *  - 1
250 X = X + XV:Y = Y + YV
255  IF X < 0 OR X > 279 THEN XV = XV *  - 1:X = X + XV: GOSUB 1000
256  IF Y < 0 OR Y > 159 THEN YV = YV *  - 1:Y = Y + YV: GOSUB 1000: POKE  - 16368,0
260  XDRAW 8 AT OX,OY: XDRAW 8 AT X,Y
270 OX = X:OY = Y
280  IF AF = 1 THEN  RETURN
290  IF H / 2 =  INT (H / 2) THEN 350
310  IF CY > B THEN B = B + (AL + 1)
320  IF CY < B THEN B = B - (AL + 1)
325  IF L = 0 AND (B > 145 OR B < 15 OR A > 265 OR A < 15) THEN  FOR P = 1 TO 10:SP =  PEEK ( - 1633
6): NEXT P:D = 2: GOTO 4000
330 A = A + AV: IF A > 279 OR A < 0 THEN AV =  - AV:CB = 0: GOSUB 1000:A = A + AV
340  GOTO 380
350  IF (CX > A) THEN A = A + (AL + 1)
360  IF (CX < A) THEN A = A - (AL + 1)
365  IF L = 0 AND (B > 145 OR B < 15 OR A > 265 OR A < 15) THEN  FOR P = 1 TO 10:SP =  PEEK ( - 1633
6): NEXT P:D = 2: GOTO 4000
```

RUNS ON AN APPLE

IN 24K

BY NEIL FORSYTH

You can tell it's almost Christmas. Even our favourite friends the aliens are getting into the festive spirit. It seems that the best selling gift this year is a space pod — and our little aliens just can't get enough of them. Some unscrupulous aliens have actually decided to resort to stealing these much sought after space pods. As an employee of Santa's Intergalactic Branch your job is to defend these pods from the marauding aliens.

This game comes in two parts. In the first you blast away at the multi-armed aliens as they attempt to steal the pods. If you manage to shoot an alien which has stolen a precious pod

STAR GUARD

before it reaches the edge of the screen you'll get the pod back. In part two — which starts after the third multi-armed alien is shot — your task is to collect pods being dropped by aliens. You must do this quickly as the aliens have the nasty habit of exploding — and will destroy you if your ship is too close. If you manage to get through unscathed the game starts again with your ship at reduced power until you reach 6000 points when you will be refueled.

Controls are; I-up, J-left, K-right, M-down.

Variables and subroutines

A............X CO-ORDINATE of alien or alien pod

AF..........When spaceship movement routine is used as a subroutine "AF" confirms use of return

AL..........Current form of alien

```
370 B = B + AV: IF B > 159 OR B < 0 THEN AV =  - AV:CB = 0: GOSUB 1000:B = B + AV
380  XDRAW AL AT OA,OB: XDRAW AL AT A,B
390 OA = A:OB = B
400  IF (A > CX - 10) * (A < CX + 10) * (B > CY - 10) * (B < CY + 10) * (CB <  > 1) THEN  GOTO 450
405  IF (A > OX - 8) * (A < OX + 8) * (B > DY - 3) * (B < DY + 4) THEN D = 4: FOR P = 1 TO 128 STEP
8: ROT= P:SP =  PEEK ( - 16336):
 XDRAW 8 AT OX,OY: NEXT P: ROT= 0: GOTO 4000
410  IF SF = 1 THEN  RETURN
420  NEXT
450  XDRAW 9 AT BX(L),BY(L)
460 L = L - 1: FOR P = 1 TO 10:SP =  PEEK ( - 16336): NEXT P
470 CB = 1
480  IF SF = 1 THEN  RETURN
490  NEXT
495  REM
496  REM ↑↑↑ MAIN ROUTINE ↑↑↑
497  REM
500 H =  INT ( RND (1) * 2) + 1
502  IF D = 4 THEN D = 1:AL = AL + 1
505  IF H / 2 =  INT (H / 2) THEN  GOTO 560
507 RA = 5
510 B =  INT ( RND (1) * 141) + 10
520 A =  INT ( RND (1) * 2) + 1
530  IF A = 1 THEN A = 0:AV = AL * 1.8
540  IF A = 2 THEN A = 279:AV =  - AL * 1.8
550  GOTO 600
560 A =  INT ( RND (1) * 280)
570 B =  INT ( RND (1) * 2) + 1
575 RA = 9
580  IF B = 1 THEN B = 0:AV = AL + 1
590  IF B = 2 THEN B = 159:AV =  - (AL + 1)
600 OA = A:OB = B
610  XDRAW AL AT OA,OB
620  RETURN
630  REM
640  REM ↑↑↑PUT ALIEN ON SCREEN↑↑↑
650  REM  & SELECT DIRECTION
660  REM  VERTICAL OR HORIZONTAL
700  IF (X > 270 AND XV > 0) OR (X < 10 AND XV < 0) THEN  RETURN
703 UXB = X: XDRAW 10 AT UXB,Y
705  IF XV < 0 THEN  FOR XB = X - 10 TO 0 STEP  - BV
710  IF XV > 0 THEN  FOR XB = X + 10 TO 279 STEP BV
715  GOSUB 290
720  XDRAW 10 AT UXB,Y: XDRAW 10 AT XB,Y
725 SP =  PEEK ( - 16336) -  PEEK ( - 16336)
740  IF (((UXB + 2 > A) AND (A > XB - 2)) OR ((UXB - 2 < A) AND (A < XB + 2)) OR ((A > XB - 5) AND (
A < XB + 5))) AND ((Y > B - RA)
AND (Y < B + RA)) THEN  GOTO 800
745  IF (UXB > CX - 10) * (UXB < CX + 10) * (OY > CY - 10) * (OY < CY + 10) THEN  XDRAW 9 AT BX(L),B
Y(L):L = L - 1: FOR P = 1 TO 10:
SP =  PEEK ( - 16336): NEXT P: IF L =  < 0 THEN D = 2: GOTO 4000
750  IF  PEEK ( - 16384) > 128 THEN  XDRAW 10 AT XB,Y: RETURN
760 UXB = XB
780  NEXT XB
785  XDRAW 10 AT UXB,Y
790  RETURN
794  REM
795  REM ↑↑↑SPACESHIP FIRES↑↑↑
796  REM
800  XDRAW AL AT OA,OB: SCALE= 2
802  FOR R = 0 TO 128 STEP 8
805  ROT= R
810  XDRAW AL AT OA,OB
815  SP =  PEEK ( - 16336)
820  NEXT R
822  XDRAW AL AT OA,OB
825  SCALE= 1
830  S = S + (10 * AL): VTAB (21): HTAB (22): PRINT S
840  REM
850  XDRAW 10 AT XB,Y
860  D = D + 1
880  IF CB = 1 THEN L = L + 1: XDRAW 9 AT BX(L),BY(L):CB = 0: PRINT  CHR$ (7);
890  IF D = 4 AND AL = 5 THEN  POP : GOTO 900
894  GOSUB 500
895  RETURN
897  REM  ↑↑↑ HIT ALIEN ROUTINE ↑↑↑
900 AF = 1
905  FOR T = T TO (T + 4)
910  GOSUB 2000
915 T1 = ( INT ( RND (1) * 5) + 3) * 10
917  POKE  - 16368,0
920  FOR N = 1 TO T1
925  GOSUB 200
930  IF (X > A - 8) * (X < A + 8) * (Y > B - 8) * (Y < B + 8) THEN S = S + 100: VTAB (21): HTAB (22)
: PRINT S: XDRAW 7 AT A,B: PRINT
  CHR$ (7);: GOTO 955
935  NEXT N
940 SC = XV * 2 *  SGN (XV): SCALE= SC: FOR R = 0 TO 127 STEP 4
942 SP =  PEEK ( - 16336)
945  ROT= R: XDRAW 10 AT A,B
950  NEXT R
951  SCALE= 1: ROT= 0: XDRAW 7 AT A,B:SC = SC * 3
952  IF (X > A - SC) * (X < A + SC) * (Y > B - SC) * (Y < B + YC) THEN D = 1: FOR P = 1 TO 128 STEP
8: ROT= P:SP =  PEEK ( - 16336):
 XDRAW 8 AT OX,OY: NEXT P: ROT= 0: GOTO 4000
955  NEXT T
960 S = S + (L * 50): VTAB (21): HTAB (22): PRINT S
```

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AV.........Aliens velocity along its chosen direction towards the center
B.........Y CO-ORDINATE of alien or alien pod
BV.........Your ships bullet velocity
CB.........Value is one if alien has got a pod
CX.........X CO-ORDINATE of screen center
CY.........Y CO-ORDINATE of screen center
D.........Number of kind of alien appeared so far (3 of each kind)(also mode of death at end of same)
H.........Randomly chosen direction for alien(horizontal or vertical)
J.........Loops
K.........Read Keyboard
L.........Number of pods left
M.........Looping
N.........Looping
OA.........Old X CO-ORDINATE of alien
OB.........Old Y CO-ORDINATE of alien
OX.........Old X CO-ORDINATE of spaceship
OY.........Old Y CO-ORDINATE of spaceship
P.........Looping
R.........Rotational loop when alien dies
RA.........Vertical range of bullet
S.........Score
SC.........Scale for spaceship power up and pod explosion
SF.........When spaceship fires, alien continues to move. Its movement routine is used as a subroutine SF determines whether the computer meets "NEXT" or "RETURN"
SP.........Speaker click
ST.........Score at which bonus power is given to spaceship(6000)
T.........Loop around main routine(s)
T1.........Time in which alien pod must be picked up before it explodes
UXB.........Old X CO-ORDINATE of bullet
VY.........Magnitude of spaceships vertical velocity
X.........X CO-ORDINATE of spaceship
XB.........X CO-ORDINATE of bullet
XV.........Velocity of spaceship (horizontal)
Y.........Y CO-ORDINATE of spaceship
YV.........Velocity of spaceship (vertical)
Z.........Looping

```
965 XV = XV -  SGN (XV):VY = VY -  SGN (VY) * (7 / 10):BV = BV - 1:AF = 0:SF = 0: IF XV = 0 THEN D =
 3: GOTO 4000
966  IF S > ST THEN ST = ST + 6000: GOSUB 5000: GOTO 155
970  GOTO 160
980  REM †††MAIN ROUTINE FOR ALIEN PODS†††
1000  FOR P = 1 TO 5:SP =  PEEK ( - 16336): NEXT : RETURN
1010  †  †  †  REM  SPEAKER BUZZ †††
2000 A =  INT ( RND (1) * 280): IF ((A > 128) * (A < 150)) + ((A > OX - 11) * (A < OX - 11)) THEN  G
OTO 2000
2010 B =  INT ( RND (1) * 140) + 20: IF (B > CY - 10) * (B < CY + 10) THEN  GOTO 2010
2020 M = B - 13:N = A
2030  HCOLOR= 2: DRAW 4 AT N,M
2035  FOR P = 1 TO 25: XDRAW 4 AT N,M:SP =  PEEK ( - 16336): NEXT P
2040  HCOLOR= 7: DRAW 4 AT N,M
2070  FOR P = 1 TO 400: NEXT P: XDRAW 4 AT N,M: XDRAW 6 AT N,M
2072  FOR P = 1 TO 500: NEXT P
2075  FOR J = 1 TO 2
2080  FOR Z = B - 10 TO B
2090  XDRAW 7 AT A,Z
2100 SP =  PEEK ( - 16336)
2110  NEXT Z
2120  NEXT J
2130  XDRAW 7 AT A,B
2135  HCOLOR= 2: DRAW 6 AT N,M
2140  FOR P = 1 TO 25: XDRAW 6 AT N,M
2145 SP =  PEEK ( - 16336)
2150  NEXT P
2160  HCOLOR= 0: DRAW 6 AT N,M
2170  HCOLOR= 7: HPLOT 0,0 TO 0,159 TO 279,159 TO 279,0 TO 0,0
2180  HPLOT 130,71 TO 147,71 TO 147,87 TO 130,87 TO 130,71
2190  RETURN
2200  REM
2210  REM ††HYPERSPACE ALIEN††
2220  REM   ON SCREEN DEPOSIT
2230  REM   ALIEN POD THEN
2240  REM   LEAVE
2250  REM
4000  TEXT : HOME
4010  FLASH
4020  IF D = 1 THEN  PRINT "THE BOOBY TRAP GOT YOU."
4030  IF D = 2 THEN  PRINT "ALL THE PODS ARE GONE."
4040  IF D = 3 THEN  PRINT "YOUR POWER CELLS ARE DEAD."
4045  IF D = 4 THEN  PRINT "THE ALIEN NABBED YOU."
4050  NORMAL
4060  PRINT
4070  PRINT "SCORE: ";S
4080  PRINT
4090  FOR P = 1 TO 500: NEXT P: POKE  - 16368,0
4100  PRINT "DO YOU WANT TO PLAY AGAIN ";: GET A$
4110  IF A$ = "Y" THEN  CLEAR : GOTO 10
4120  TEXT : HOME : END
4130  REM
4140  REM  ††† END OF GAME ROUTINE †††
4150  REM
5000  FOR N = 1 TO 2
5010  FOR SC = 12 TO 1 STEP  - 1
5015  SCALE= SC
5020  XDRAW 8 AT X,Y
5025  POKE 768,SC * N * 10: POKE 769,10: CALL 770
5030  REM  ††† PLAY MUSIC NOTES †††
5040  NEXT SC
5050  NEXT N
5060  RETURN
5070  REM
5080  REM †††POWER UP SPACESHIP †††
5090  REM
6000  FOR X = 770 TO 792
6010  READ Y
6020  POKE X,Y
6030  NEXT X
6040  DATA    173,48,192,136,208,5,206,1,3,240,9,202,208,245,174,0,3,76,2,3,96,0,0
6050  RETURN
6060  REM
6070  REM  †††† POKE IN MUSIC ROUTINE ††††
6080  REM
10000  HGR2 : TEXT : POKE 232,16: POKE 233,64
10010  SCALE= 1: ROT= 0
10020  FOR X = 16400 TO 16575
10030  READ Y
10040  POKE X,Y
10050  NEXT X
10060  DATA  10,0,22,0,35,0,52,0,64,0,84,0,109,0,131,0,141,0,164,0,170,0
10070  DATA 62,63,44,33,36,53,42,45,62,51,54,39,0
10080  DATA 39,39,39,9,10,9,53,59,54,45,58,31,27,39,41,4,0
10090  DATA 42,44,37,60,55,63,60,55,46,53,21,0
10100  DATA 62,27,39,37,45,44,46,44,42,46,62,62,54,35,60,63,55,41,46,0
10110  DATA 13,60,63,63,39,13,44,13,53,13,62,22,53,23,59,12,60,63,39,23,55,13,46,5,0
10120  DATA 62,27,39,37,45,44,46,44,42,46,62,46,30,30,36,63,63,63,14,53,5,0
10130  DATA 63,12,37,21,46,30,63,14,5,0
10140  DATA  54,45,46,44,37,45,60,39 ,63,60,62,63,39,55,63,62,55,45,46,53,37,45,0
10150  DATA 62,36,45,54,7,0
10160  DATA 63,12,17,41,13,0
10170  RETURN
10180  REM
10190  REM  †††† POKE SHAPE TABLE ††††
10200  REM        ONTO HGR2 SCREEN
10210  REM        TO SAVE MEMORY
10220  REM
```



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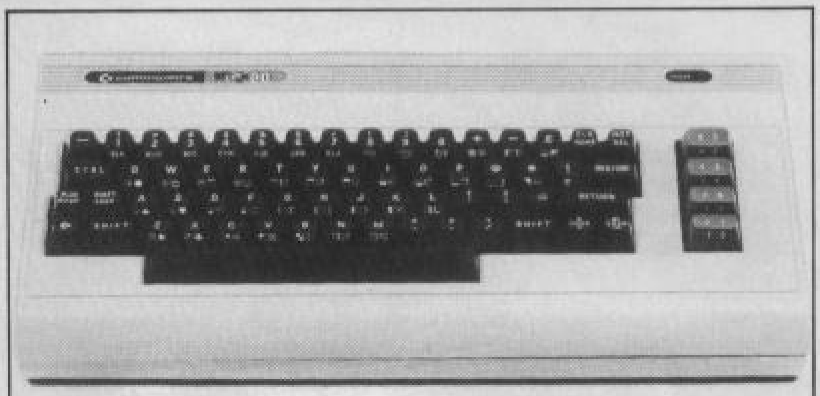
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ALIEN CHASE

BY JANEK SIRRS

RUNS ON A BBC MODEL B IN 32K

ZZZZZZZZZipppppppp! There goes another run-away alien! Can you stop them reaching the enemy bases and telling them all your secrets? You have to chase the swift aliens through an asteroid belt. You must catch them before they reach the bottom of the screen — otherwise they escape and your secrets will be common knowledge among the little green meanies. Unfortunately the only way you can stop the runaway is pretty terminal. You blast him with a laser. As the game progresses the alien runaways get quicker and the number of asteroids increases — making things just a bit more difficult.

The cursor keys control left and right movement while the Space fires the deadly laser.

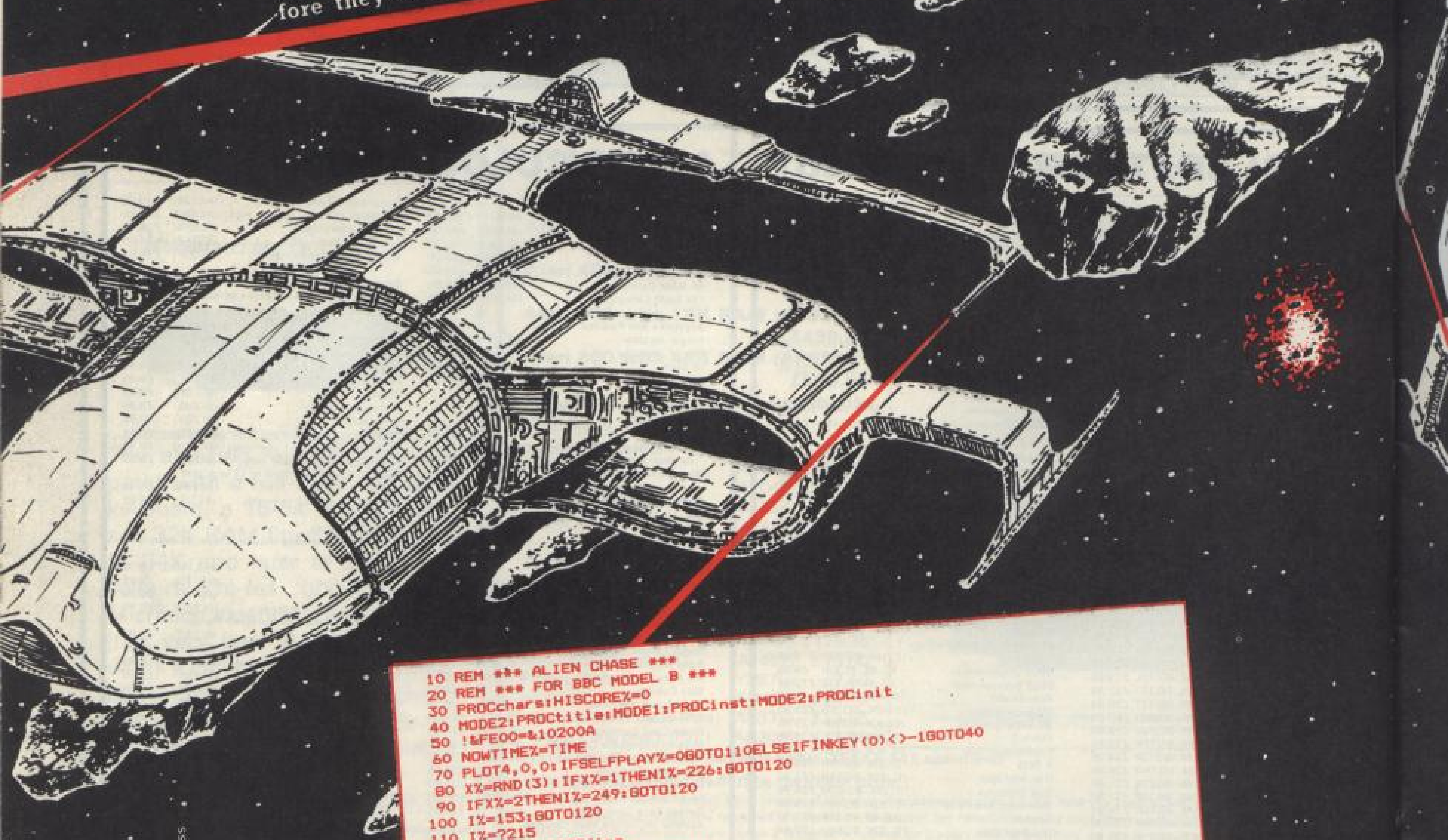
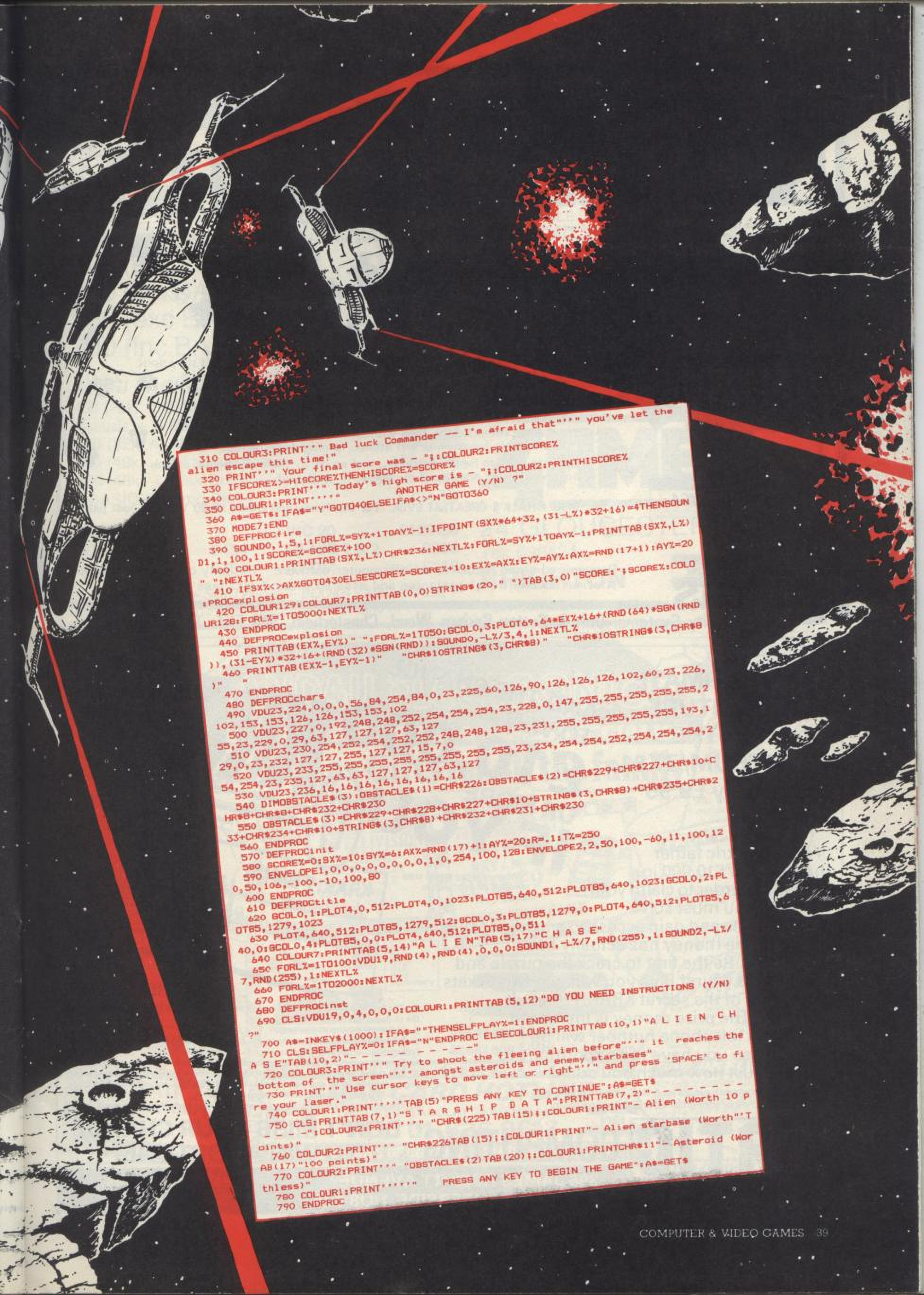


Illustration Dorian Cross

```
10 REM *** ALIEN CHASE ***
20 REM *** FOR BBC MODEL B ***
30 PROCchars:HISCORE%=0
40 MODE2:PROCtitle:MODE1:PROCinst:MODE2:PROCinit
50 !&FE00=&10200A
60 NOWTIME%=TIME
70 PLOT4,0,0:IFSELFPLAY%=0GOTO110ELSEIFINKEY(0)<>-1GOTO40
80 X%=RND(3):IFX%=1THENI%=226:GOTO120
90 IFX%=2THENI%=249:GOTO120
100 I%=153:GOTO120
110 I%=?215
120 IFI%=226PROCfire
130 IFI%=153THENI%=-1:GOTO160
140 IFI%=249THENI%=1:GOTO160
150 I%=0
160 COLOUR7:PRINTTAB(SX%,SY%)" ":IFSX%+I%<0ORSX%+I%>19THENI%=0
170 IFPOINT(64*(SX%+I%)+32,(31-SY%)*32+16)>0GOTO280
180 SX%=SX%+I%:PRINTTAB(SX%,SY%)CHR$224:CHR$30
190 X%=RND(3):IFX%=1THENI%=-1ELSEIFX%=2THENI%=0ELSEI%=1
200 IFTIME>=NOWTIME%+T%THENNOWTIME%=TIME:J%=1:T%=T%-1:IFAY%=30COLOUR12:PRINTTA
B(AX%,AY%)CHR$225:COLOUR8:PRINTTAB(1,12)"THE ALIEN ESCAPES!":FORL%=1TO30000:NEXT
L%:COLOUR7:PRINTTAB(0,12)STRING$(40," "):GOTO280
210 IFAX%+I%<0ORAX%+I%>19THENI%=0
220 COLOUR2:PRINTTAB(AX%,AY%)" ":AX%=AX%+I%:AY%=AY%+J%:J%=0:PRINTTAB(AX%,AY%)C
HR$225CHR$30
230 IFPOINT(64*SX%+32,(31-SY%-1)*32+16)>0GOTO280
240 PRINTTAB(SX%,SY%)" "TAB(AX%,AY%)" ":X%=RND(4):IFX%=4 OR R<RND(1)PRINTTAB(0
,31)" ":GOTO260
250 COLOUR3+X%:PRINTTAB(RND(17)-1,32-X%)OBSTACLE$(X%)
260 COLOUR7:PRINTTAB(SX%,SY%)CHR$224:COLOUR2:PRINTTAB(AX%,AY%)CHR$225:R=R+.001
:IFR>.9THENR=.9
270 GOTO70
280 EX%=SX%:EY%=SY%:PROCexplosion:COLOUR8:PRINTTAB(5,12)"GAME OVER!":FORL%=1TO
20000:NEXTL%
290 IFSELFPLAY%=1GOTO40ELSEMODE1:VDU19,0,4,0,0,0:COLOUR1
300 COLOUR1:PRINTTAB(10,1)"A L I E N   C H A S E":PRINTTAB(10,2)"- - - - -  - -
- - - "
```



```
                                                    you've let the
 310 COLOUR3:PRINT''" Bad luck Commander -- I'm afraid that"''"
alien escape this time!"
 320 PRINT''" Your final score was - ";:COLOUR2:PRINTSCORE%
 330 IFSCORE%>=HISCORE%THENHISCORE%=SCORE%
 340 COLOUR3:PRINT''" Today's high score is - ";:COLOUR2:PRINTHISCORE%
 350 COLOUR1:PRINT''''"            ANOTHER GAME (Y/N) ?"
 360 A$=GET$:IFA$="Y"GOTO40ELSEIFA$<>"N"GOTO360
 370 MODE7:END
 380 DEFPROCfire
 390 SOUND0,1,5,1:FORL%=SY%+1TOAY%-1:IFPOINT(SX%*64+32,(31-L%)*32+16)=4THENSOUN
D1,1,100,1:SCORE%=SCORE%+100
 400 COLOUR1:PRINTTAB(SX%,L%)CHR$236:NEXTL%:FORL%=SY%+1TOAY%-1:PRINTTAB(SX%,L%)
" ":NEXTL%
 410 IFSX%<>AX%GOTO430ELSESCORE%=SCORE%+10:EX%=AX%:EY%=AY%:AX%=RND(17+1):AY%=20
:PROCexplosion
 420 COLOUR129:COLOUR7:PRINTTAB(0,0)STRING$(20," ")TAB(3,0)"SCORE: ";SCORE%:COLO
UR128:FORL%=1TO5000:NEXTL%
 430 ENDPROC
 440 DEFPROCexplosion
 450 PRINTTAB(EX%,EY%)" ":FORL%=1TO50:GCOL0,3:PLOT69,64*EX%+16+(RND(64)*SGN(RND
)),(31-EY%)*32+16+(RND(32)*SGN(RND)):SOUND0,-L%/3,4,1:NEXTL%
 460 PRINTTAB(EX%-1,EY%-1)"   "CHR$10STRING$(3,CHR$8)"   "CHR$10STRING$(3,CHR$8
)"   "
 470 ENDPROC
 480 DEFPROCchars
 490 VDU23,224,0,0,0,56,84,254,84,0,23,225,60,126,90,126,126,126,102,60,23,226,
102,153,153,126,126,153,153,102
 500 VDU23,227,0,192,248,248,252,254,254,254,23,228,0,147,255,255,255,255,255,2
55,23,229,0,29,63,127,127,127,63,127
 510 VDU23,230,254,252,254,252,252,248,248,128,23,231,255,255,255,255,255,193,1
29,0,23,232,127,127,255,127,127,15,7,0
 520 VDU23,233,255,255,255,255,255,255,255,255,23,234,254,254,252,254,254,254,2
54,254,23,235,127,63,63,127,127,127,63,127
 530 VDU23,236,16,16,16,16,16,16,16,16
 540 DIMOBSTACLE$(3):OBSTACLE$(1)=CHR$226:OBSTACLE$(2)=CHR$229+CHR$227+CHR$10+C
HR$8+CHR$8+CHR$232+CHR$230
 550 OBSTACLE$(3)=CHR$229+CHR$228+CHR$227+CHR$10+STRING$(3,CHR$8)+CHR$235+CHR$2
33+CHR$234+CHR$10+STRING$(3,CHR$8)+CHR$232+CHR$231+CHR$230
 560 ENDPROC
 570 DEFPROCinit
 580 SCORE%=0:SX%=10:SY%=6:AX%=RND(17)+1:AY%=20:R=.1:T%=250
 590 ENVELOPE1,0,0,0,0,0,0,0,0,1,0,254,100,128:ENVELOPE2,2,50,100,-60,11,100,12
0,50,106,-100,-10,100,80
 600 ENDPROC
 610 DEFPROCtitle
 620 GCOL0,1:PLOT4,0,512:PLOT4,0,1023:PLOT85,640,512:PLOT85,640,1023:GCOL0,2:PL
OT85,1279,1023
 630 PLOT4,640,512:PLOT85,1279,512:GCOL0,3:PLOT85,1279,0:PLOT4,640,512:PLOT85,6
40,0:GCOL0,4:PLOT85,0,0:PLOT4,640,512:PLOT85,0,511
 640 COLOUR7:PRINTTAB(5,14)"A L I E N"TAB(5,17)"C H A S E"
 650 FORL%=1TO100:VDU19,RND(4),RND(4),0,0,0:SOUND1,-L%/7,RND(255),1:SOUND2,-L%/
7,RND(255),1:NEXTL%
 660 FORL%=1TO2000:NEXTL%
 670 ENDPROC
 680 DEFPROCinst
 690 CLS:VDU19,0,4,0,0,0:COLOUR1:PRINTTAB(5,12)"DO YOU NEED INSTRUCTIONS (Y/N)
?"
 700 A$=INKEY$(1000):IFA$=""THENSELFPLAY%=1:ENDPROC
 710 CLS:SELFPLAY%=0:IFA$="N"ENDPROC ELSECOLOUR1:PRINTTAB(10,1)"A L I E N  C H
A S E"TAB(10,2)"- - - - -  - - - - -"
 720 COLOUR3:PRINT''" Try to shoot the fleeing alien before"''" it  reaches the
bottom of  the screen"''" amongst asteroids and enemy starbases"
 730 PRINT''" Use cursor keys to move left or right"''" and press 'SPACE' to fi
re your laser."
 740 COLOUR1:PRINT''''TAB(5)"PRESS ANY KEY TO CONTINUE":A$=GET$
 750 CLS:PRINTTAB(7,1)"S T A R S H I P  D A T A":PRINTTAB(7,2)"- - - - - - - -
- - - -":COLOUR2:PRINT''" "CHR$(225)TAB(15);:COLOUR1:PRINT"- Alien (Worth 10 p
oints)"
 760 COLOUR2:PRINT''" "CHR$226TAB(15);:COLOUR1:PRINT"- Alien starbase (Worth"'T
AB(17)"100 points)"
 770 COLOUR2:PRINT''" "OBSTACLE$(2)TAB(20);:COLOUR1:PRINTCHR$11"- Asteroid (Wor
thless)"
 780 COLOUR1:PRINT'''''"     PRESS ANY KEY TO BEGIN THE GAME":A$=GET$
 790 ENDPROC
```

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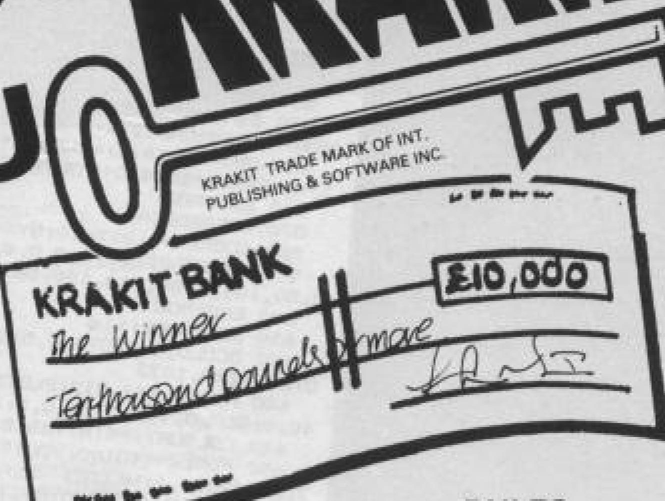
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RUNS ON A ZX81 IN 16K

BY C. J. BARHAM

YACHT II

```
  10 LET T$="ABCDE"
  20 DIM H(5)
  70 LET P1=1
  72 LET LE=10
  80 LET P2=5
  90 LET P3=12
 100 LET PLUS=60
 110 LET Z$="1  ONES---2  TWOS--
-3  THREES 4  FOURS--5  FIVES--6
  SIXES--*SUB TOTAL**BONUS***7
CHOICE-8  FULL/HS9  4/KIND-10 LT
L/ST-11 BIG/ST-12 YACHT--***TOTA
L**"
 800 CLS
 802 PRINT AT 10,10;"YACHTZEE"
 810 PRINT AT 12,1;"HOW MANY PLA
YERS ? (1-4)"
 820 INPUT PLYRS
 830 IF PLYRS<1 OR PLYRS>4 THEN
GOTO 800
 832 RAND
 840 CLS
 900 FAST
 902 LET NUMG=0
 910 LET PL=1
 920 DIM P(PLYRS,15)
 930 FOR N=1 TO PLYRS
 940 FOR M=1 TO 14
 942 IF M=7 OR M=8 THEN GOTO 960
 950 LET P(N,M)=-1
 960 NEXT M
 970 NEXT N
 980 GOSUB 8000
 990 SLOW
1000 LET TURN=0
1002 PRINT AT 18,1;"PLAYER ";PL
1006 LET A$="ABCDE"
1008 GOTO 1022
1010 PRINT AT 20,0;"CHOOSE"
1012 INPUT A$
1014 PRINT AT 20,0;"          "
1020 IF A$="" THEN GOTO 2000
1022 PRINT AT 18,10;"THROW ";TUR
N+1
1030 GOSUB 9000
1040 LET TURN=TURN+1
1050 IF TURN<3 THEN GOTO 1010
2000 GOSUB 9200
2010 PRINT AT 20,0;"OPTION ?"
2012 PRINT AT 21,0;"(1-12)"
2020 INPUT OP
2030 PRINT AT 20,0;"          "
2032 PRINT AT 21,0;"          "
2050 IF OP<1 OR OP>12 THEN GOTO
2010
2052 IF OP>6 THEN LET OP=OP+2
2060 IF P(PL,OP)>=0 THEN GOTO 20
10
2070 LET PTS=0
2080 LET FLAG=0
2090 IF OP>6 THEN GOTO 2200
2100 GOSUB 9900
2110 LET P(PL,7)=P(PL,7)+PTS
2112 PRINT AT 7,(PL-1)*P2+P1+P3;
P(PL,7)
2120 IF P(PL,7)<PLUS THEN GOTO 3
000
2122 IF P(PL,8)>0 THEN GOTO 3000
2130 LET P(PL,8)=50
2140 PRINT AT 8,(PL-1)*P2+P1+P3-
1;"*50*"
2150 LET P(PL,15)=P(PL,15)+50
2200 IF OP<>9 THEN GOTO 2300
2210 FOR N=1 TO 5
2220 LET PTS=PTS+H(N)
2230 NEXT N
2240 GOTO 3000
2300 GOSUB 9200
2308 IF OP=10 THEN GOSUB 9500
2310 IF OP=11 THEN GOSUB 9400
2320 IF OP=12 THEN GOSUB 9600
2330 IF OP=13 THEN GOSUB 9700
2340 IF OP=14 THEN GOSUB 9300
3000 LET P(PL,OP)=PTS
3010 PRINT AT OP,(PL-1)*P2+P3+P1
;PTS
3012 LET P(PL,15)=P(PL,15)+PTS
3014 PRINT AT 15,(PL-1)*P2+P1+P3
;P(PL,15)
3020 LET PL=PL+1
3030 IF PL<(PLYRS+1) THEN GOTO 1
000
3040 LET PL=1
3050 LET NUMG=NUMG+1
3060 IF NUMG<12 THEN GOTO 1000
3080 GOSUB 7000
3090 PRINT AT 18,8;WIN;" WINS
"
```

Illustration: Dorian Cross



```
3100 IF INKEY$<>"" THEN GOTO 800
3110 FOR N=1 TO 10
3120 NEXT N
3130 PRINT AT 18,8;" "
3140 FOR N=1 TO 3
3150 NEXT N
3160 GOTO 3090
7000 REM S/R TO DETERINE WINNER
7010 LET MAX=P(1,15)
7020 LET WIN=1
7030 IF PLYRS=1 THEN RETURN
7040 FOR N=2 TO PLYRS
7050 IF P(N,15)<=MAX THEN GOTO 7
080
7060 LET MAX=P(N,15)
7070 LET WIN=N
7080 NEXT N
7100 RETURN
8000 REM S/R TO PRINT CATS
8010 FOR N=1 TO 15
8020 LET PS=(N-1)*LE+1
8030 LET PF=PS+LE-1
8040 PRINT AT N,1;Z$(PS TO PF)
8050 NEXT N
8060 FOR N=1 TO 5
8070 PRINT AT 20,(N-1)*3+10;T$(N
)
8080 NEXT N
8090 FOR N=1 TO PLYRS
8100 PRINT AT 0,(N-1)*P2+P3;"*P"
;N;"*"
8110 NEXT N
8120 RETURN
9000 REM S/R TO THROW REQD DICE
9010 LET N1=LEN A$
9020 FOR N=1 TO N1
9030 FOR M=1 TO 5
9040 IF A$(N)<>T$(M) THEN GOTO 9
060
9050 LET H(M)=INT (RND*6)+1
9060 NEXT M
9070 NEXT N
9080 FOR N=1 TO 5
9090 PRINT AT 21,(N-1)*3+10;H(N)
9100 NEXT N
9110 RETURN
9200 REM S/R TO COUNT SPOTS
9210 DIM C(6)
```

```
9230 FOR N=1 TO 5
9240 LET C(H(N))=C(H(N))+1
9250 NEXT N
9260 RETURN
9300 REM S/R TO CALC YACHT
9310 FOR N=1 TO 6
9320 IF C(N)=5 THEN LET PTS=50
9330 NEXT N
9340 RETURN
9400 REM S/R TO CALC 4/KIND
9410 FOR N=1 TO 6
9420 IF C(N)>=4 THEN LET FLAG=1
9440 NEXT N
9450 IF FLAG<>1 THEN RETURN
9460 FOR N=1 TO 5
9470 LET PTS=PTS+H(N)
9480 NEXT N
9490 RETURN
9500 REM S/R TO CALC FL/HSE
9510 GOSUB 9800
9520 IF CT<>4 THEN RETURN
9530 FOR N=1 TO 5
9540 LET PTS=PTS+H(N)
9550 NEXT N
9560 RETURN
9600 REM S/R TO CALC LTL/ST
9610 GOSUB 9800
9640 IF C(6)=0 AND CT=1 THEN LET
 PTS=30
9650 RETURN
9700 REM S/R TO CALC BIG/ST
9710 GOSUB 9800
9720 IF C(1)=0 AND CT=1 THEN LET
 PTS=30
9730 RETURN
9800 REM S/R TO CALC CT
9810 LET CT=0
9820 FOR N=1 TO 6
9830 IF C(N)=0 THEN LET CT=CT+1
9840 NEXT N
9850 RETURN
9900 REM S/R TO CALC 123456
9910 FOR N=1 TO 5
9920 IF OP=H(N) THEN LET PTS=PTS
+OP
9930 NEXT N
9940 RETURN
```



WHAT PEOPLE ARE SAYING ABOUT OUR . . .

BBC MICRO GAMES

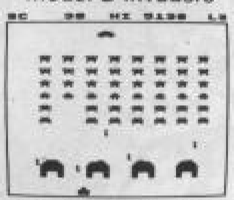
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Actual screen photo

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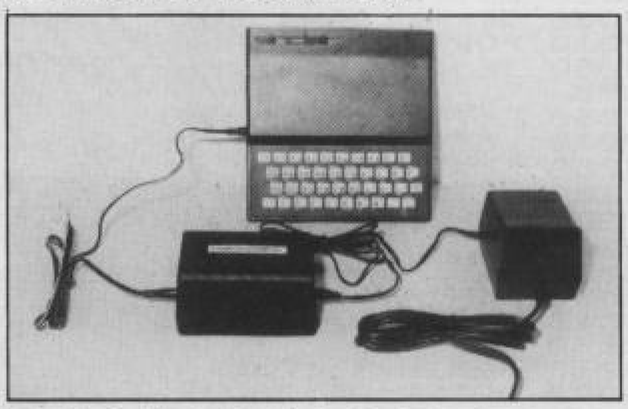
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SPACE ROLLER

RUNS ON A SPECTRUM IN 16K

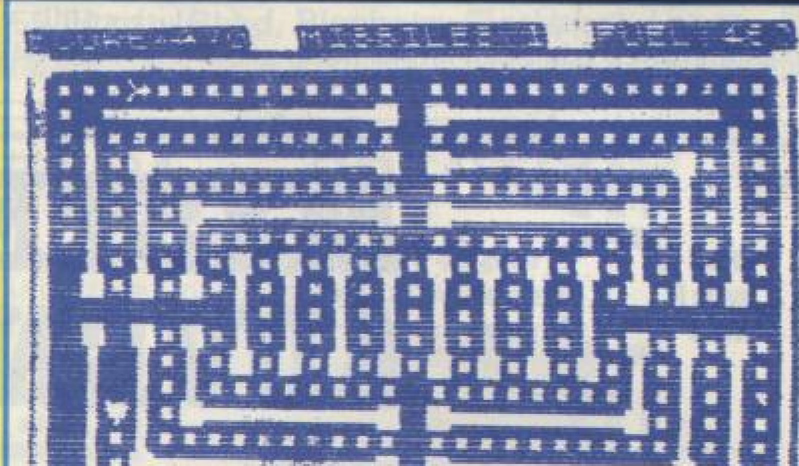
BY DAVID HOUNSLOW

Painting white lines down the middle of the road has never been an easy task. All those motorcycles, cars and juggernauts racing around are hardly an ideal environment for the creative white line painter. But now things are getting even worse. I suppose it had to happen in the era of the microchip. Someone carrying out one of those time and motion studies has come up with the idea that white line painters would work quicker if missiles were chasing them. A fair point I hear you say. Anyone would work quicker if a highly explosive missile was coming their way . . .

This is a mixture of two arcade games. You have to guide a white line painter along a road — eating dots and painting lines at the same time. You must also remember to avoid the heat seeking missile which chases you.

Keys 5, 6, 7, 8, control your movement. Pressing 1 will double your speed — pressing it a second time will return you to normal speed. However this uses more fuel and should only be used in emergencies. When you manage to clear a screen another will appear with two missiles — one of them travelling at double speed. There are a couple more features of the game which must remain a mystery — but *Computer and Video Games* readers like mysteries — don't you!

Illustration: Terry Rogers



```
   1 DIM e$(2): DIM o(2): DIM f$
(2): DIM x(2): DIM y(2): DIM s(2
)
   2 LET h$="0": LET g$="0": LET
 dots=0: LET score=0: LET y=20:
LET x=25: LET w$="5"
   3 LET o(1)=56: LET o(2)=56: L
ET x(1)=28: LET y(1)=2: LET x(2)
=28: LET y(2)=4: LET s(1)=1: LET
 s(2)=2
   4 LET w=0
  10 LET fuel=500: RESTORE : PAP
ER 7: BORDER 7: BRIGHT 0: INK 1:
 INVERSE 1: OVER 0: FLASH 0: CLS

  20 FOR r=0 TO 7: POKE USR "a"+
r,60: NEXT r
  30 FOR r=0 TO 7: POKE USR "b"+
r,0: IF r>1 AND r<6 THEN POKE US
R "b"+r,255
  40 NEXT r
  50 FOR i=146 TO 154
  60 FOR r=0 TO 7
  70 READ a: POKE USR CHR$ (i)+r
,a
  80 NEXT r
  90 NEXT i
 100 DATA BIN 00011000,BIN 00011
```

```
200,BIN 01111110,BIN 01111110,25
5,255,255,BIN 11000011
 110 DATA BIN 11000011,255,255,2
55,BIN 01111110,BIN 01111110,BIN
 00011000,BIN 00011000
 120 DATA BIN 11110000,BIN 11111
100,BIN 01111100,BIN 01111111,BI
N 01111111,BIN 01111100,BIN 1111
1100,BIN 11110000
 130 DATA BIN 00001111,BIN 00111
111,BIN 00111110,BIN 11111110,BI
N 11111110,BIN 00111110,BIN 0011
1111,BIN 00001111
 140 DATA BIN 00011000,BIN 00111
100,BIN 01111110,BIN 00011000,BI
N 00011000,BIN 00111100,BIN 1110
0111,BIN 11000011
 150 DATA BIN 11000011,BIN 11100
111,BIN 00111100,BIN 00011000,BI
N 00011000,BIN 01111110,BIN 0011
1100,BIN 00011000
 160 DATA BIN 11,BIN 00100011,BI
N 01100110,BIN 11111100,BIN 1111
1100,BIN 01100110,BIN 00100011,B
IN 11
 170 DATA BIN 11000000,BIN 11000
100,BIN 01100110,BIN 00111111,BI
N 00111111,BIN 01100110,BIN 1100
0100,BIN 11000000
 180 DATA 0,0,60,60,60,60,0,0
 190 REM
 191 REM          MAIN PROGRAM
 192 REM
 193 PRINT #0;"  SPACEROLLER    B
y D.Hounslow"
 200 PRINT AT 0,11;"MISSILES: ";m
+1: FOR i=1 TO 21: PRINT AT i,0;
"█";AT i,30;"█": NEXT i
 205 PRINT AT 1,0;"██████████████
██████████████████";AT 21,0;"████
██████████████████████████████"
 210 FOR i=2 TO 20: PRINT AT i,1
; INK 0;"▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪
▪▪▪▪▪▪": NEXT i
 220 PRINT AT 3,2;" ████████████
████████████ ";AT 19,2;" ████████
████████████████"
 230 FOR i=4 TO 9: PRINT AT i,2;
"█";AT i,28;"█";AT i+9,2;"█";AT
i+9,28;"█": NEXT i
 240 PRINT AT 10,2;"█";AT 11,1;
INK 4;"   "; INK 1;AT 12,2;"█"
 250 PRINT AT 10,28;"█";AT 11,27
; INK 4;"   "; INK 1;AT 12,28;"█
"
 260 PRINT AT 3,14;"█"; INK 4;"
"; INK 1;"█";AT 19,14;"█"; INK 4
;" "; INK 1;"█"
 270 PRINT INK 4;AT 2,15;" ";AT
4,15;" ";AT 18,15;" ";AT 20,15;"
"
 280 PRINT AT 5,4;"██████████";
 INK 4;" "; INK 1;"██████████";
AT 17,4;"██████████"; INK 4;" "
; INK 1;"██████████"
 290 FOR i=6 TO 10: PRINT AT i,4
;"█";AT i,26;"█";AT i+6,4;"█";AT
 i+6,26;"█": NEXT i
 300 PRINT AT 10,4;"█";AT 12,4;"
█";AT 10,26;"█";AT 12,26;"█"
 310 PRINT INK 4;AT 11,4;"  ";AT
 11,25;"  "
 320 PRINT AT 7,6;"████████"; I
NK 4;" "; INK 1;"████████";AT 1
5,6;"████████"; INK 4;" "; INK
1;"████████"
 330 FOR i=8 TO 9: PRINT AT i,6;
"█";AT i,24;"█";AT i+5,6;"█";AT
i+5,24;"█": NEXT i
 340 PRINT AT 10,6;"█";AT 10,24;
"█";AT 12,6;"█";AT 12,24;"█"
 350 PRINT INK 4;AT 11,6;"  ";AT
 11,23;"  ";AT 6,15;" ";AT 8,15;
" ";AT 14,15;" ";AT 16,15;" "
 360 FOR i=8 TO 22 STEP 2: PRINT
 AT 9,i;"█";AT 13,i;"█": NEXT i
 370 FOR i=10 TO 12: FOR j=8 TO
22 STEP 2: PRINT AT i,j;"█": NEX
T j: NEXT i
 374 REM
 375 REM          THE GAME
 376 REM
 380 INK 4
 400 LET m=m+1: LET s=1: IF m=3
THEN LET m=2: LET s(2)=2
 425 FOR o=1 TO s
 435 LET o$=m$
 436 IF INKEY$="1" THEN LET h$=g
$: LET g$="": LET g$=("1" AND h$
="0")+("0" AND h$="1"): LET s=2*
(h$="1")+(h$="0")
 437 IF s=2 THEN LET fuel=fuel-1
: IF fuel<=0 THEN LET g$="0": LE
T s=1
 438 LET fuel=fuel-1: PRINT INK
2;AT 0,23;"FUEL:";fuel*(fuel>=0)
: IF fuel<0 THEN PRINT AT 0,26;"
0   "
 440 IF INKEY$<>"" AND INKEY$<>"
1" THEN LET m$=INKEY$
 441 LET oldy=y: LET oldx=x
 445 PRINT AT y,x;" "
 450 LET x=x+(m$="8" AND (ATTR (
y,x+1)=56 OR ATTR (y,x+1)=60))-(
m$="5" AND (ATTR (y,x-1)=56 OR A
TTR (y,x-1)=60))
 460 LET y=y+(m$="6" AND (ATTR (
y+1,x)=56 OR ATTR (y+1,x)=60))-(
m$="7" AND (ATTR (y-1,x)=56 OR A
TTR (y-1,x)=60))
 500 IF ATTR (y,x)=56 THEN BEEP
.001,40: LET score=score+10: LET
 fuel=fuel+1: PRINT AT 0,0; INK
2;"SCORE:";score: LET dots=dots+
1: IF dots>=200 THEN LET s(1)=2:
 IF dots>=290 THEN LET dots=0: L
ET s(1)=1: GO TO 10
 504 IF (x=x(1) AND y=y(1)) OR (
x=x(2) AND y=y(2) AND m=2) THEN
GO TO 700
 505 IF oldy=y AND oldx=x THEN L
ET m$=o$
 510 IF m$="5" OR m$="6" OR m$="
7" OR m$="8" THEN LET d$="": LET
 d$=("█" AND m$="6")+("█" AND m$
="7")+("█" AND m$="8")+("█" AND
m$="5")
 515 PRINT AT y,x; INK 2;d$
 516 NEXT o
 520 FOR p=1 TO m
 530 FOR q=1 TO s(p)
 535 LET p$="": IF RND>.7 THEN G
O TO 570
 540 LET p$=("8" AND x<x(p) AND
(ATTR (y(p),x(p)-1)=58 OR ATTR (
y(p),x(p)-1)=56 OR ATTR (y(p),x(
p)-1)=60))+("5" AND x>x(p) AND (
ATTR (y(p),x(p)+1)=58 OR ATTR (y
(p),x(p)+1)=56 OR ATTR (y(p),x(p
)+1)=60))
 560 IF p$<>"" THEN GO TO 580
 570 LET p$=("7" AND y(p)>y AND
(ATTR (y(p)-1,x(p))=58 OR ATTR (
y(p)-1,x(p))=56 OR ATTR (y(p)-1,
x(p))=60))+("6" AND y(p)<y AND (
ATTR (y(p)+1,x(p))=58 OR ATTR (y
(p)+1,x(p))=56 OR ATTR (y(p)+1,x
(p))=60))
 575 IF p$="" THEN LET p$=e$(p):
 GO TO 577
 580 PRINT AT y(p),x(p);" ": IF
o(p)=56 THEN PRINT AT y(p),x(p);
 INK 0;"▪"
 590 LET x(p)=x(p)-(p$="8" AND (
ATTR (y(p),x(p)-1)=58 OR ATTR (y
(p),x(p)-1)=60 OR ATTR (y(p),x(p
)-1)=56))+(p$="5" AND (ATTR (y(p
),x(p)+1)=58 OR ATTR (y(p),x(p)+
1)=60 OR ATTR (y(p),x(p)+1)=56))
: IF p$="7" OR p$="6" THEN LET y
(p)=y(p)-(p$="7" AND (ATTR (y(p)
-1,x(p))=58 OR ATTR (y(p)-1,x(p)
)=56 OR ATTR (y(p)-1,x(p))=60))+
(p$="6" AND (ATTR (y(p)+1,x(p))=
58 OR ATTR (y(p)+1,x(p))=56 OR A
TTR (y(p)+1,x(p))=60))
 600 LET o(p)=ATTR (y(p),x(p))
 610 IF p$<>"" THEN LET f$(p)=""
: LET f$(p)=("█" AND p$="7")+("█
" AND p$="6")+("█" AND p$="8")+(
"█" AND p$="5")
 620 PRINT AT y(p),x(p);f$(p)
 625 LET e$(p)=p$
 626 IF y(p)=y AND x(p)=x THEN G
O TO 700
 630 NEXT q: NEXT p
 640 GO TO 425
 700 INK 2: BRIGHT 1: FLASH 1: P
APER 7: CLS : BEEP 1,-40: FLASH
0: BRIGHT 0: CLS : PRINT AT 10,1
0;"SCORE:";score: FOR x=1 TO 100
: NEXT x: RUN
```



"You youngsters don't know how well off you are! It's not easy being an old-age-pensioner you know. Take my trip to the post office to get my pension for instance. I have to cross an extremely busy road — dodging the big lorries and cars because they haven't put in a crossing yet. It's lucky I'm still quick on my pins otherwise I wouldn't be talking to you now. I've had several close shaves I can tell you! But that's not the end of it. After the road comes the river and as I never learnt to swim as a girl I had to devise a special way of getting across. It took me weeks and weeks and several loaves of Mother's Pride to get the ducks to help me out. Now they let me use them as stepping stones to get to the other side. I bounce off their backs like water off a . . . well you know the rest of that old saying don't you! The only trouble is that sometimes one of my feathered friends decides to take a quick dip just as I am about to step aboard. So far I've managed to avoid a ducking! Just my little joke. But I'm sure one day I'll end up in the drink. Anyway this nice young gentleman has just offered to take me across the road so I'll see you again soon — as long as the ducks are still friendly by the time I reach the river. Byeeee!"

As you may have guessed by now this game is a version of that arcade favourite Frogger. In this version the frog is replaced by a granny and the frog's nests by several post offices. You are given four minutes to get seven grannies to a post office so you have to move fairly quickly. When the seventh granny reaches her destination she gets a double pension and you get another chance to help seven more old ladies across the road. The game starts slowly but speeds up. When a score of 2000 points has been reached the game is at its maximum speed — and will prove difficult to even the most avid Frogger player.

Illustration: Terry Rogers

Variables.

A$(1-8), B$(1-16), C$(1-8): car, log and duck strings. A$: General get statement variable. H: Number of grannies and post offices. TI$: Time. Y: Distance down the screen. X: Distance right of the screen. A: Peeked number of character that granny is standing on. I: General movement loop. P: Peeked number of key being pressed. HT: Number of times granny has been hit. L: Delay loop. SC: Score.



```
1 DIMB$(16),A$(8),C$(8)
10 PRINT"□▧    GRANNY    ■":REM BY ANDREW MORTON.
20 PRINT"▧YOU ARE A GRANNY'▧▧■'WHO HAS TO GO TO THE"
25 PRINT"POST OFFICE BUT YOU MUST FIRST CROSS THE";
30 PRINT"ROAD OUTSIDE YOUR HOUSE."
35 PRINT"WHEN YOU HAVE DONE THIS YOU FIND THAT "
40 PRINT"THE BRIDGE IS OUT.THERE'S ONLY ONE THING";
45 PRINT"THAT YOU CAN DO ; JUMP ONTO THE"
50 PRINT"DUCKS AND LOGS FLOATING DOWN THE RIVER."
55 PRINT"THEN ALL THAT IS LEFT TO DO IS TO JUMP"
60 PRINT"INTO THE POST OFFICE."
65 PRINT"▧▧ YOU CAN'T SWIM,OR JUMP THE CARS ■"
70 PRINT"▧IF YOU MOVE OFF THE SIDE OF THE SCREEN"
75 PRINT"YOU WILL LOSE ONE OF YOUR THREE LIVES."
80 PRINT"LOGS=▧    ■    :    DUCKS= ●  "
85 PRINT"LORRIES=▒▒▒   :    RIVER BANK=▧!!!!■"
90 PRINT"ROAD=::::::   :    RIVER=-----"
95 PRINT"P/O =▧!!■ ▧!!■    :    DIVING DUCKS= O"
97 PRINT"▧TO MOVE USE, ▧8■UP  ▧4■LEFT  ▧6■RIGHT  ▧2■DOWN"
98 PRINT"▧▧ PRESS ANY KEY TO START"
99 REM LOGS AND CARS VARIABES
```

GRANNY

BY ANDREW MORTON

RUNS ON A 40 col PET IN 12K

```
100 A$(1)="▧▧▧▧●O---●●-●O---●●-●O---●●-●O---●●-●O---●●-●O---●●-"
110 A$(1)=A$(1)+"O●-●●---●O●-●●---●O●-●●-▧▧▧▧▧▧-●O●-●●---●O●-●●---●"
120 A$(1)=A$(1)+":::▒::▧▧▧▒▒▒::▒:::▒▒▒::▒:::▒▒▒:::▒::▒▒▒:::▒::▒▒▒:::▒::▒▒▒"
130 A$(1)=A$(1)+"▒▒▒▒:::::▒▒▒▒:::::▒▒▒▒::::▒▒▒▒::::▒▒▒▒:::::▒▒▒▒:::::▒▒▒▒::▒▒▒▒:::▒::▒▒▒"
140 A$(2)="▧▧▧▧●---O●-●●---O●-●●---O●-●●---O●-●●---▧▧▧▧::▒▒▒▒::::"
150 A$(2)=A$(2)+"●●-O●---●●●-O●---●●●-O●---●●●-O●---▧▧▧▧▧▧●●-O●---●●●-O●---●"
160 A$(2)=A$(2)+":::▒::▧▧▧▒▒::▒:::▒▒▒::▒:::▒▒▒:::▒::▒▒▒:::▒::▒▒▒:::▒::▒▒▒"
170 A$(2)=A$(2)+":▒▒▒▒:::::▒▒▒▒::::▒▒▒▒::::▒▒▒▒::::▒▒▒▒:::::▒▒▒▒::▧▧▧▧:▒▒▒▒::::"
180 A$(3)="▧▧▧▧---●●-O●---●●-O●---●●-O●---●●-O●---●●-O●---▧▧▧:▒▒▒▒::::"
190 A$(3)=A$(3)+"●O-●●---●●O-●●---●●O-●●---●●O-●●---O●▧▧▧▧▧▧●O-●●---●●O-●●---●"
200 A$(3)=A$(3)+":::▒::▒▒▧▧▧::▒:::▒▒▒::▒:::▒▒▒:::▒::▒▒▒:::▒::▒▒▒:::▒::▒▒▒"
210 A$(3)=A$(3)+":▒▒▒▒:::::▒▒▒▒::::▒▒▒▒::::▒▒▒▒::::▒▒▒▒:::::▒▒▒▒::::▒▒▒▒::::"
220 A$(4)="▧▧▧▧--●O-●●---●O-●●---●O-●●---●O-●●---●O-●●-▧▧▧▧▒▒▒▒::::"
230 A$(4)=A$(4)+"●●-●O---●●●-●O---●●●-●O---●●▧▧▧▧::▒::▒▒▒:::▒::▒▒▒:::▒::▒▒▒"
240 A$(4)=A$(4)+"●●-●O---●●●-●O---●●●-●O---●●▧▧▧▧▧▧O-●●---●●●-●O---●"
250 A$(4)=A$(4)+":::▒::▒▒▒▧▧▧:▒:::▒▒▒::▒:::▒▒▒:::▒::▒▒▒:::▒::▒▒▒:::▒::▒▒▒"
260 A$(5)="▧▧▧▧-●●-●●---●●-●●---●●-●●---●●-●●---●●-●●-▧▧▧▧▒▒▒::::"
270 A$(5)=A$(5)+"●●-●●---O●●-●●---O●●-●●---O●●▧▧▧▧::▒::▒▒▒:::▒::▒▒▒:::▒::▒▒▒"
280 A$(5)=A$(5)+"●●-●●---O●●-●●---O●●-●●---●●-●●---▧▧▧▧▧▧-●●---●●●-●●---●"
290 A$(5)=A$(5)+":::▒::▒▒▒:▧▧▧▒:::▒▒▒::▒:::▒▒▒:::▒::▒▒▒:::▒::▒▒▒:::▒::▒▒▒"
300 A$(6)="▧▧▧▧●●-●O---●●-●O---●●-●O---●●-●O---●●-●O---▧▧▧▧▒▒▒::::"
310 A$(6)=A$(6)+"-●●---●●●-●●---●●●-●●---●●●-●●---●●●-▧▧▧:▒:::▒▒▒::▒::▒▒▒"
320 A$(6)=A$(6)+"-●●---●●●-●●---●●●-●●---●●-●O---▧▧▧▧▧▧O●---●●●-O●---●●●"
330 A$(6)=A$(6)+":::▒::▒▒▒:▧▧▧:::▒▒▒::▒:::▒▒▒:::▒::▒▒▒:::▒::▒▒▒:::▒::▒▒▒:"
340 A$(7)="▧▧▧▧O-●●---●O-●●---●O-●●---●O-●●---●O-●●---▧▧▧▧::::"
350 A$(7)=A$(7)+"-●●---●O●-●●---●O●-●●---●O●-●●---●O-●●---▒▒▒▒"
360 A$(7)=A$(7)+"-●●---●O●-●●---●O●-●▧▧▧▧▒::▒▒▒:::▒::▒▒▒▧▧▧▧▧▧●---●●●-●●---●●●"
370 A$(7)=A$(7)+":::▒::▒▒▒::▧▧▧::▒▒▒::▒:::▒▒▒:::▒::▒▒▒:::▒::▒▒▒:::▒::▒▒▒:"
380 A$(8)="▧▧▧▧-●●---●●-●●---●●-●●---●●-●●---●●-●●---▧▧▧::::"
390 A$(8)=A$(8)+"-●●---●●●-●●---●●●-●●---●●●-●●---●●▧▧▧▧▧▧---●●●-●●---●●●"
400 A$(8)=A$(8)+"-●●---●●●-●●---●●●-●●---●●●-●●▧▧▧:▒▒▒::▒:::▒▒▒:::▒::▒▒▒"
410 A$(8)=A$(8)+"::▒::▒▒▒:::▒▧▧▧:▒▒▒::▒:::▒▒▒:::▒::▒▒▒:::▒::▒▒▒:::▒::▒▒▒:"
420 B$(1)="▧▧▧▧▧▧▧ ■---▧    ■---▧    ■---▧    ■---▧    ■---▧   ■▧▧▧▧▧▧▧▧▧▧"
430 B$(1)=B$(1)+"▒::::▒▒▒▒:::::▒▒▒▒:::::▒▒▒▒:::::▒▒▒▒::::▒▒▒▒::▒▒▒▒:::▒::▧▧▧::"
440 B$(2)="▧▧▧▧▧▧▧  ■---▧    ■---▧    ■---▧    ■---▧    ■---▧   ■▧▧▧▧▧▧▧▧▧▧"
450 B$(2)=B$(2)+"▒▒▒::::▒▒▒▒:::::▒▒▒▒:::::▒▒▒▒:::::▒▒▒▒::::▒"
460 B$(3)="▧▧▧▧▧▧▧   ■---▧    ■---▧    ■---▧    ■---▧    ■---▧  ■▧▧▧▧▧▧▧▧▧▧"
470 B$(3)=B$(3)+"▒▒▒▒::::▒▒▒▒:::::▒▒▒▒:::::▒▒▒▒:::::▒▒▒▒::::▒"
480 B$(4)="▧▧▧▧▧▧▧    ■---▧    ■---▧    ■---▧    ■---▧    ■---▧ ■▧▧▧▧▧▧▧▧▧▧"
490 B$(4)=B$(4)+":▒▒▒▒::::▒▒▒▒:::::▒▒▒▒:::::▒▒▒▒:::::▒▒▒▒::::"
500 B$(5)="▧▧▧▧▧▧-▧    ■---▧    ■---▧    ■---▧    ■---▧    ■---▧▧▧▧▧▧▧▧▧▧"
510 B$(5)=B$(5)+"::▒▒▒▒::::▒▒▒▒:::::▒▒▒▒:::::▒▒▒▒:::::▒▒▒▒:::"
520 B$(6)="▧▧▧▧▧▧--▧    ■---▧    ■---▧    ■---▧    ■---▧    ■--▧▧▧▧▧▧▧▧▧▧"
530 B$(6)=B$(6)+":::▒▒▒▒::::▒▒▒▒:::::▒▒▒▒:::::▒▒▒▒:::::▒▒▒▒::"
540 B$(7)="▧▧▧▧▧▧---▧    ■---▧    ■---▧    ■---▧    ■---▧    ■-▧▧▧▧▧▧▧▧▧▧"
550 B$(7)=B$(7)+"::::▒▒▒▒::::▒▒▒▒:::::▒▒▒▒:::::▒▒▒▒:::::▒▒▒▒:"
560 B$(8)="▧▧▧▧▧▧----▧    ■---▧    ■---▧    ■---▧    ■---▧    ■▧▧▧▧▧▧▧▧▧▧"
570 B$(8)=B$(8)+":::::▒▒▒▒::::▒▒▒▒:::::▒▒▒▒:::::▒▒▒▒:::::▒▒▒▒"
580 FORI=1TO8:B$(I+8)=B$(I):NEXTI
590 C$(1)="▧▧▧▧▧▧▧▧▧  ■-▧   ■---▧   ■-▧   ■---▧   ■-▧   ■---▧   ■-▧   ■---▧"
600 C$(1)=C$(1)+"---▧▧▧▧▧▧▧▧▧▧▧▧▧::▒:::▒:::▒:::▒:::▒:::▒:::▒:::▒:::▒:::▒"
610 C$(2)="▧▧▧▧▧▧▧▧-▧   ■-▧   ■---▧   ■-▧   ■---▧   ■-▧   ■---▧   ■-▧   ■"
620 C$(2)=C$(2)+"--▧▧▧▧▧▧▧▧▧▧▧▧▧▒:::▒:::▒:::▒:::▒:::▒:::▒:::▒:::▒:::▒:::"
630 C$(3)="▧▧▧▧▧▧▧▧--▧   ■-▧   ■---▧   ■-▧   ■---▧   ■-▧   ■---▧   ■-▧   ■"
635 C$(3)=C$(3)+"-▧▧▧▧▧▧▧▧▧▧▧▧▧:▒:::▒:::▒:::▒:::▒:::▒:::▒:::▒:::▒:::"
640 C$(4)="▧▧▧▧▧▧▧▧---▧   ■-▧   ■---▧   ■-▧   ■---▧   ■-▧   ■---▧   ■-▧   ■"
```



Illustration: Terry Rogers

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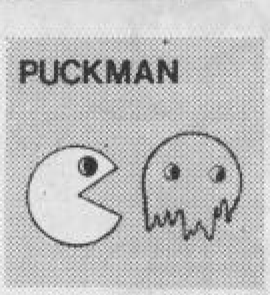
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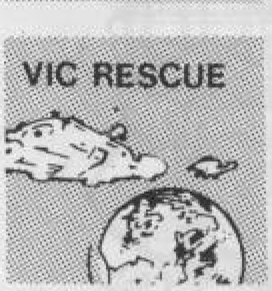
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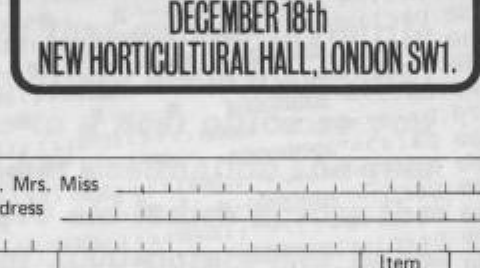
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```
650 C$(4)=C$(4)+"▨  ■▨▨▨▨▨▨▨▨▨▨▨:::▒:::▒:::▒:::▒:::▒:::▒:::▒:::▒:::▒:::▒:"
660 C$(5)="▨▨▨▨▨▨▨▨▨ ■---▨  ■-▨  ■---▨  ■-▨  ■---▨  ■-▨  ■---▨  ■-▨  ■---▨  ■"
670 C$(5)=C$(5)+"-▨ ■▨▨▨▨▨▨▨▨▨▨▨:::▒:::▒:::▒:::▒:::▒:::▒:::▒:::▒:::▒:::▒"
680 C$(6)="▨▨▨▨▨▨▨▨▨  ■---▨  ■-▨  ■---▨  ■-▨  ■---▨  ■-▨  ■---▨  ■-▨  ■---"
690 C$(6)=C$(6)+"▨  ■-▨▨▨▨▨▨▨▨▨▨▨▒:::▒:::▒:::▒:::▒:::▒:::▒:::▒:::▒:::▒:::"
700 C$(7)="▨▨▨▨▨▨▨▨-▨  ■---▨  ■-▨  ■---▨  ■-▨  ■---▨  ■-▨  ■---▨  ■-▨  ■---"
710 C$(7)=C$(7)+"▨  ■▨▨▨▨▨▨▨▨▨▨▨:▒:::▒:::▒:::▒:::▒:::▒:::▒:::▒:::▒:::▒::"
720 C$(8)="▨▨▨▨▨▨▨▨▨ ■-▨  ■---▨  ■-▨  ■---▨  ■-▨  ■---▨  ■-▨  ■---▨  ■-▨  ■---"
730 C$(8)=C$(8)+"▨ ■▨▨▨▨▨▨▨▨▨▨▨:::▒:::▒:::▒:::▒:::▒:::▒:::▒:::▒:::▒:::▒:"
732 HT=0:REMSET UP VARIABLES AND SCREEN
733 GETA$:IFA$=""THEN733
735 PRINT"▯▒TIME LEFT=▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▨!!!■ ▨!!!■ ▨!!!■ ▨!!!";
736 PRINT"■ ▨!!!■ ▨!!!■ ▨!!!■ ▨!!!!■";
740 FORI=1TO5:PRINT"■---------------------------------------":NEXTI
745 PRINT"▯▨!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!▯▯"
750 FORI=1TO6:PRINT"::::::::::::::::::::::::::::::::::::::::":NEXTI
760 PRINT"▯▨!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!";
765 PRINT"!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!■";
800 H=0
910 TI$="000000"
920 Y=23:X=1+INT(39*RND(1))
990 POKE32768+40*Y+X,193
995 A=161
1000 FORI=1TO16:REM LOOP FOR MOVEMENT
1010 P=PEEK(151)
1020 IFP<>255ANDA<>161THENSC=SC+10
1030 IFP<>255THEN2000
1040 PRINTA$((I+1)/2)B$(I)C$((I+1)/2):REM PRINT LOGS AND DUCKS
1041 IFY<11THENGOTO5000
1042 IFPEEK(32768+40*Y+X)<>193THENA=PEEK(32768+40*Y+X)
1044 IFA=102ORA=45ORA=87THEN6000
1046 POKE32768+Y*40+X,193
1050 PRINT"▨"TAB(12)INT((14400-TI)/60);"■▒▒▒GRANNYS LEFT=";2-HT
1060 IFTI>=14400THENGOTO6000
1080 FORL=1TO200-SC/10:NEXTL
1090 NEXTI
1095 GOTO1000
2000 IFP=50THEN2500
2010 IFP=42THEN3000
2020 IFP=41THEN3500
2030 IFY=23THENGOTO1040
2035 POKE32768+Y*40+X,A:REM MOVE DOWN
2040 Y=Y+1
2050 A=PEEK(32768+40*Y+X)
2060 POKE32768+40*Y+X,193
2070 FORL=1TO5:NEXTL
2080 POKE32768+40*Y+X,A
2090 Y=Y+1
2100 GOTO1040
2500 POKE32768+Y*40+X,A:REM MOVE UP
2510 Y=Y-1
2520 A=PEEK(32768+40*Y+X)
2530 POKE32768+40*Y+X,193
2540 FORL=1TO5:NEXTL
2550 POKE32768+40*Y+X,A
2570 Y=Y-1
2575 IFY=1THENGOTO4000
2580 GOTO1040
3000 POKE32768+Y*40+X,A:REM MOVE LEFT
3010 X=X-1
3020 IFX<0THEN6000
3030 GOTO1040
3500 POKE32768+Y*40+X,A
3510 X=X+1
3520 IFX>39THEN6000
3530 GOTO1040
4000 IFPEEK(32768+40*Y+X)<>32THEN6000:REM ARE YOU IN THE POST OFFICE
4005 POKE32768+40*Y+X,65
4007 FORL=1TO1000:NEXTL
4010 H=H+1:SC=SC+100
4020 IFH=7THENSC=SC+100:GOTO0735
4030 GOTO0920
5000 ON(Y-1)/2GOTO5010,5100,5200,5010REM MOVE GRANNY WHEN ON LOGS AND DUCKS
5010 IFI/2<>INT(I/2)THENX=X-1
5020 GOTO1042
5100 X=X+1:GOTO1042
5200 IFI/2<>INT(I/2)THENX=X+1
5210 GOTO1042
6000 HT=HT+1:REM YOU HAVE LOST A LIFE
6002 IFHT=3THENGOTO6015
6005 FORK=1TO1000:NEXT
6010 GOTO920
6015 PRINT"▯▨▨▨▨YOUR SCORE IS";SC:REM END OF GAME
6017 IFTI>14400THENPRINT"▨▨YOU RAN OUT OF TIME■"
6019 PRINT"▨▨HIGH SCORE=";SH
6020 PRINT"▨▨▨PRESS ANY KEY TO GO AGAIN"
6030 FORK=1TO10:GETD$:NEXTK
6045 IFSC>SHTHENSH=SC
6047 SC=0
6050 GOTO732
```







Illustrations: Terry Rogers

```
1 REM  HUNGARIAN HEX
2 REM  A MANIPULATIVE PUZZLE
3 REM
4 REM  IN TI BASIC  FOR THE
5 REM  TI 99/4A HOME COMPUTER
6 REM
7 REM  (WILL ALSO RUN IN
8 REM   TI EXTENDED BASIC)
9 REM
10 REM (C) 1982 STEPHEN SHAW
11 REM
12 REM AVAILABLE ON TAPE
13 REM FOR 3.00 INC P&P FROM:
14 REM
15 REM 10,ALSTONE ROAD
16 REM STOCKPORT
17 REM CHESHIRE
18 REM SK4 5AH
19 REM ______________________
100 CALL SCREEN(15)
110 DIM COL(2,6)
120 RANDOMIZE
130 GOTO 220
140 CALL SOUND(-10,1000,5)
150 CALL COLOR(9,COL(1,1),COL(1,
2))
160 CALL COLOR(10,COL(1,3),COL(1
,4))
170 CALL COLOR(11,COL(1,5),COL(1
,6))
180 CALL COLOR(12,8,1)
190 CALL COLOR(13,14,2)
200 RETURN
210 STOP
220 CALL CLEAR
230 PRINT "ONE MOMENT.....": :
240 FOR I=1 TO 2
250 FOR I2=1 TO 6
260 READ A
270 COL(I,I2)=A
280 NEXT I2
290 NEXT I
300 FOR I=1 TO 6
310 CHECK=CHECK+COL(1,I)*7
320 NEXT I
330 DATA 4,10,9,7,13,3
340 DATA 6,12,2,11,5,16,99
350 F$="FFFFFFFFFFFFFFFF"
360 CALL CHAR(96,F$)
370 CALL CHAR(104,F$)
380 CALL CHAR(112,F$)
390 F$="0"
400 CALL CHAR(97,F$)
410 CALL CHAR(105,F$)
420 CALL CHAR(113,F$)
430 CALL CHAR(120,F$)
440 CALL CHAR(128,F$)
450 REM
460 GOTO 1150
470 FOR A=0 TO 30 STEP 5
480 CALL SOUND(-99,698,A,1924,A)
490 NEXT A
500 CALL GCHAR(7,15,A)
510 CALL GCHAR(7,17,B)
520 CALL VCHAR(6,15,B,5)
530 CALL VCHAR(6,17,A,5)
540 RETURN
550 FOR A=700 TO 800 STEP 10
560 CALL SOUND(-99,A,0)
570 NEXT A
580 B=COL(2,6)
590 A=COL(1,6)
600 FOR I=6 TO 2 STEP -1
610 COL(1,I)=COL(1,I-1)
620 COL(2,I)=COL(2,I-1)
630 NEXT I
640 COL(1,1)=A
650 COL(2,1)=B
660 RETURN
670 FOR A=830 TO 700 STEP -13
680 CALL SOUND(-99,A,0)
690 NEXT A
700 A=COL(1,1)
710 B=COL(2,1)
720 FOR I=1 TO 5
730 COL(1,I)=COL(1,I+1)
740 COL(2,I)=COL(2,I+1)
750 NEXT I
760 COL(1,6)=A
770 COL(2,6)=B
780 RETURN
790 CALL SOUND(5,-3,5)
800 CALL SOUND(30,-7,20)
810 CALL SOUND(400,-7,29)
820 A=COL(1,1)
830 COL(1,1)=COL(2,5)
840 COL(2,5)=A
850 A=COL(2,1)
860 COL(2,1)=COL(1,5)
870 COL(1,5)=A
880 A=COL(1,6)
890 COL(1,6)=COL(2,6)
900 COL(2,6)=A
910 CALL GCHAR(7,15,A)
920 IF (A=120)+(A=128)THEN 940
930 A=A-2
940 A=A+1
950 CALL VCHAR(6,15,A,5)
960 RETURN
970 FOR A=0 TO 30 STEP 12
980 CALL SOUND(-99,1000,A,3250,A
,6750,A)
990 NEXT A
1000 A=COL(1,2)
1010 COL(1,2)=COL(2,4)
1020 COL(2,4)=A
1030 A=COL(1,4)
1040 COL(1,4)=COL(2,2)
1050 COL(2,2)=A
1060 A=COL(1,3)
1070 COL(1,3)=COL(2,3)
1080 COL(2,3)=A
1090 CALL GCHAR(7,17,A)
1100 IF (A=120)+(A=128)THEN 1120
1110 A=A-2
1120 A=A+1
1130 CALL VCHAR(6,17,A,5)
1140 RETURN
1150 CALL CLEAR
1160 PRINT "HUNGARIAN HEX":" (C)
1982 S SHAW": :
1170 PRINT "YOU HAVE A DISK LIKE
 OBJECT TO MANIPULATE."
1180 PRINT "THERE IS AN OUTER RI
NG WITH 6 COLOURS AND TWO INNER"
:"PARTS."
1190 PRINT "YOU MAY SWOP THE TWO
 INNER  PARTS,ROTATE THE OUTER R
ING"
1200 PRINT "OR SWIVEL THE LEFT O
R RIGHT SIDES (IT HAS A BACK & A
     FRONT)."
1210 PRINT "YOU MAY MANIPULATE T
HE":"SCREEN ONLY,OR THE COMPUTER
 WILL JUMBLE IT FOR YOU TO":"RES
TORE."
1220 PRINT : : :
1230 PRINT "PRESS ENTER TO CONTI
NUE.."
1240 INPUT A$
1250 CALL CLEAR
1260 PRINT "PRESS:": :"1 TO MANI
PULATE":"2 TO RESTORE": : : :
1270 CALL KEY(0,A,B)
1280 IF (A<49)+(A>50)THEN 1270
1290 IF A=49 THEN 1470
1300 PRINT "CHOOSE LEVEL OF DIFF
ICULTY": :"PRESS 1,2,3 OR 4": :
1310 CALL KEY(0,A,B)
1320 IF B<1 THEN 1310
1330 IF (A<49)+(A>52)THEN 1310
1340 PRINT "FIRST YOU WILL SEE T
HE":"ORIGINAL LAYOUT."
1350 PRINT "THEN THERE WILL BE A
 SHORT  DELAY WHEN THE SCREEN WI
LL  PARTLY BLANK."
1360 PRINT "THEN YOU MUST RESTOR
E THE":"PUZZLE.": : :
1370 FOR I=1 TO 900
1380 NEXT I
1390 GOSUB 1750
1400 GOSUB 140
1410 FOR T=1 TO 600
1420 NEXT T
1430 FOR I=1 TO 11
1440 CALL COLOR(I,1,1)
1450 NEXT I
1460 GOTO 1510
1470 GOSUB 1750
1480 GOSUB 140
1490 GOTO 1630
1500 STOP
1510 FOR P=1 TO 3*(A-48)+1
1520 ON INT(RND*5+1)GOSUB 470,55
0,670,790,970
1530 NEXT P
1540 FLAG=1
1550 GOSUB 140
1560 CALL COLOR(12,8,1)
1570 CALL COLOR(13,14,2)
1580 FOR I=1 TO 8
1590 CALL COLOR(I,2,1)
1600 NEXT I
1610 REM END RANDOMIZE
1620 REM NOW THE MANIPULATION
1630 CALL SOUND(200,330,0)
1640 CALL KEY(0,A,B)
1650 IF B<1 THEN 1640
1660 IF (A<49)+(A>53)THEN 1630
1670 ON A-48 GOSUB 470,550,670,7
90,970
1680 GOSUB 140
1690 A=0
1700 FOR I=1 TO 6
1710 A=A+COL(1,I)*7
1720 NEXT I
1730 IF A=CHECK THEN 2160 ELSE 1
630
1740 STOP
1750 CALL CLEAR
1760 PRINT "ONE MOMENT...": :
1770 REM S1$=7 SPACES
1780 REM S2$=PLUS 2 SPACES
1790 S1$="       "
1800 S2$=S1$&"  "
1810 FOR I=1 TO 4
1820 S96$=S96$&CHR$(96)
1830 S97$=S97$&CHR$(97)
1840 S113$=S113$&CHR$(113)
```

PROGRAM NOTES

100-130:	Initialisation
140-200:	Display current colours (subroutine)
220-460:	Set up initial colours, stored in the 2-dimensional array COL(N,M), where COL(1,M) is to face, and COL(2,M) is the back of the same piece
470-540:	Subroutine to switch the central pieces
550-660:	Subroutine to move outer ring clockwise
670-780:	the same thing anticlockwise
790-960:	subroutine to swivel the left hand side
970-1140:	same thing but right hand side
1150-1290:	Instructions and first choice
1300-1610:	Computer randomizes display (invisibly)
1620-1680	Input routine to manipulate display
1690-1730	Check to see if back to original display
1750-2140	Subroutine to print display
2150-2260:	Successful end to puzzle

This program occupies 4950 bytes, but requires 5589 bytes to run. Because full use is made of the special colour and sound commands of the 99/4A, it will be difficult to translate this program.

All sixteen colours are used to form a colourful display, and good use is made of the CALL SOUND command.

Novice programmers may find lines 1660 and 2190 of interest — in 1660 the '+' takes the place of *OR*, and in 2190 the '*' takes the place of *AND* — these are useful devices to use.

The PRINT commands should be typed exactly as they appear, as the program uses the GCHAR command in manipulating the central areas.



HUNGARIAN HEX

RUNS ON A TI99/4A IN 6K

BY STEPHEN SHAW

Remember Hungarian Squares? If that had you tearing your hair out wait until you try this new one from the devious mind of Stephen Shaw. This one does not involve squares — just rings — and it's sure to have you going around in circles.

The puzzle may be imagined as a disc with an outer ring of six colours and an inner ring of two colours. It is double sided and the outer and inner rings can be rotated.

There is also another — vertical — axis of rotation at right angles to the screen. This gives an almost 3D effect to the puzzle.

You are given the option of either manipulating the puzzle, or allowing the computer to jumble it up and attempting to restore it. Four skill levels make this brain twister a lasting challenge — will you take it up? Remember, the Cube has got nothing on this! Happy puzzling . . .

```
1850 S104$=S104$&CHR$(104)
1860 S112$=S112$&CHR$(112)
1870 S105$=S105$&CHR$(105)
1880 NEXT I
1890 FOR I=1 TO 5
1900 PRINT S2$&S96$&" "&S97$
1910 NEXT I
1920 PRINT
1930 FOR I=1 TO 5
1940 PRINT S1$&S113$&" "&CHR$(12
0)&" "&CHR$(128)&" "&S104$
1950 NEXT I
1960 PRINT
1970 FOR I=1 TO 5
1980 PRINT S2$&S112$&" "&S105$
1990 NEXT I
2000 PRINT "PRESS:":"1 TO SWOP C
ENTRE"
2010 PRINT "2 TO ROTATE CLOCKWIS
E"
2020 PRINT "3 TO ROTATE ANTICLOC
KWISE"
2030 PRINT "4 TO SWIVEL LEFT SID
E"
2040 PRINT "5 TO SWIVEL RIGHT SI
DE"
2050 PRINT
2060 F$="9191919191919191"
2070 CALL CHAR(120,F$)
2080 CALL CHAR(128,F$)
2090 F$="FF0000FF0000FF00"
2100 CALL CHAR(121,F$)
2110 CALL CHAR(129,F$)
2120 CALL COLOR(12,8,1)
2130 CALL COLOR(13,14,2)
2140 RETURN
2150 STOP
2160 CALL GCHAR(7,15,A)
2170 IF FLAG<>1 THEN 1630
2180 CALL GCHAR(7,17,I)
2190 IF (A=120)*(I=128)THEN 2210
2200 GOTO 1630
2210 CALL CLEAR
2220 PRINT "YOU RESTORED THE PAT
TERN!":"CONGRATULATIONS":"TO PLA
Y AGAIN:"
2230 PRINT "PRESS 'CLEAR' AND TH
EN ":"ENTER 'RUN'"
2240 PRINT : : :
2250 GOTO 2250
2260 END
```

Photograph: Linda Freeman

to your wife.

SPECIFICATIONS
6809E MICROPROCESSOR. Pet, Apple, Atari 400, BBC Micro, and VIC 20 still have the less powerful 6502.
32K RAM (as standard). At least twice the power of similarly priced machines. Expandable to 64K RAM.
EXTENDED MICROSOFT COLOUR BASIC (as standard). Featuring: ADVANCED GRAPHICS (set, line, circle, paint, print, draw, rotate and print using). ADVANCED SOUND 5 octaves, 255 tones. AUTOMATIC CASSETTE RECORDER CONTROL. FULL EDITING with INSERT and DELETE.
9 COLOUR, 5 RESOLUTION DISPLAY.
USE WITH ANY U.H.F. TV and/or separate P.A.L. monitor.
PROFESSIONAL QUALITY KEYBOARD. Typewriter feel. Guaranteed for 20 million depressions.
PRINTER (Centronics parallel).
JOYSTICK CONTROL PORTS.

with 5 octaves of music. How it will engross your children in mind-boggling adventures in dungeons and caves without even getting their knees dirty. And the Dragon works with any U.H.F. TV.



THEY'LL LEARN AS THEY PLAY.

And then you can casually point out that although the kids are having fun, they're also learning. And within a very short space of time, the whole family will be completely at home with programming - with computer language - with every aspect of how computers work. Which can't do their future prospects any harm at all.

BRILLIANTLY SIMPLE INSTRUCTION MANUAL.

The Dragon is made in Britain, designed with the help of British Universities. And it's also worth remembering that the Dragon's instruction manual is clearer and easier to understand than any other home computer's.



That its top-quality keyboard is as easy to use as a typewriter, and so well made it's guaranteed for twenty million depressions.

TAKE THE FAMILY DOWN THE HIGH STREET.

And if she still wants to know more, take her to see the Dragon 32. It'll soon be available in most good stores - or you can send the coupon for further details.

And if you're one of our many lady readers, please accept our apologies.

Perhaps you'd like to read this ad to your husband.

DRAGON 32
The first family computer.

To: Jean Webster, Dragon Data Ltd., Queensway, Swansea Industrial Estate, Swansea, Glamorgan SA5 4EH.
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AIRLOCK

RUNS ON AN ATARI 400/800 IN 24K WITH JOYSTICK

BY STEPHEN LINGER

It's just another routine day in the life of the men working away in the heart of an advanced nuclear reactor when suddenly the unthinkable happens. A radiation alert. Sirens blare out a warning and emergency procedures go into action.

The maintenance men have to leave their underground workplace as rapidly as possible. The failsafe mechanism is beginning to shut down the reactor and seal off areas with airtight doors. Will you be able to get them out before time runs out?

Doors are opening and closing all over the building. Touching the walls will prove fatal — they are contaminated by the radiation leak.

One touch and you are finished.

You must keep moving always take the exit presented to you. Try not to get trapped.

Before starting the game ensure the joystick is plugged into port one on the front of your Atari. Apart from the initial Run instruction the whole game is controlled from the joystick.

```
5 REM AIRLOCK
7 REM BY S.F.LINGER
8 REM SPRINGFIELD CHELMSFORD ESSEX
10 GOSUB 3000
20 X=185:Y=115:C=0
25 HITCLR=53278
30 A=PEEK(106)-24:POKE 54279,A:PMBASE=25
6*A
40 GOSUB 1000:REM BUILD FIRST MAZE
50 POKE 559,46:POKE 623,4:POKE 53277,3:P
OKE 53248,X
60 FOR J=PMBASE+512 TO PMBASE+640:POKE J
,0:NEXT J
70 POKE 704,124
80 FOR J=PMBASE+512+Y TO PMBASE+516+Y:RE
AD A:POKE J,A:NEXT J
90 DATA 10,28,40,8,20
100 RESTORE (90)
102 GOSUB 105:SETCOLOR 2,3,8:GOTO 117
105 FOR W=1 TO INT(RND(1)*1000)+500:NEXT
 W
110 FOR Z=1 TO 3:FOR Z1=150 TO 20 STEP -
7:SOUND 0,Z1,10,7:SOUND 1,Z1+7,10,7:SOUN
D 2,Z1+14,10,7
112 FOR W=1 TO 20:NEXT W
115 SETCOLOR 2,3,INT(RND(1)*8)+2:NEXT Z1
:NEXT Z
116 FOR M=0 TO 2:SOUND M,0,0,0:NEXT M:SE
TCOLOR 2,15,3:RETURN
117 E=0
118 POKE HITCLR,0
120 A=STICK(0)
121 E=E+1:IF E>40 THEN GOTO 1700
125 POKE 87,1:POSITION 2,4:? #6;"radiati
on leak"
127 POSITION 2,5:? #6;"clear building"
130 IF A=15 THEN GOTO 120
135 C=C+1:IF C=350 THEN GOTO 1500
```

Illustration: Jon Davis

```
137 IF C=13 THEN COLOR 2:POKE 87,7:PLOT 134,70:DRAWTO 134,80
140 IF A=11 OR A=10 OR A=9 THEN X=X-2:POKE 53248,X
150 IF A=7 OR A=6 OR A=5 THEN X=X+2:POKE 53248,X
160 IF A=13 OR A=9 OR A=5 THEN FOR J=10 TO 0 STEP -1:POKE PMBASE+512+Y+J,PEEK(PMBASE+510+Y+J):NEXT J:Y=Y+2
170 IF A=14 OR A=10 OR A=6 THEN FOR J=0 TO 10:POKE PMBASE+510+Y+J,PEEK(PMBASE+512+Y+J):NEXT J:Y=Y-2
175 L=PEEK(53252):IF L<>0 THEN GOTO 2000
180 SOUND 0,140,10,4:FOR W=1 TO 10:NEXT W:SOUND 0,0,0,0
185 D=2:G=INT(2*RND(1)+3):IF G=4 THEN D=4
200 POKE 87,7:GOSUB INT(RND(1)*17)*10+500
300 ON X=205 GOTO 4000
900 GOTO 117
1000 GRAPHICS 23:SETCOLOR 4,15,3:SETCOLOR 0,11,6:SETCOLOR 2,15,3
1005 START=PEEK(560)+PEEK(561)*256+4
1010 POKE START-1,66:POKE START+2,2
1015 POKE START+149,65:POKE START+150,PEEK(560):POKE START+151,PEEK(561)
1017 POKE START+3,6:POKE START+4,6
1020 COLOR 1:PLOT 0,62:DRAWTO 4,62:DRAWTO 4,10:DRAWTO 144,10
1025 DRAWTO 144,40:DRAWTO 154,40:DRAWTO 154,60
1030 COLOR 1:PLOT 0,62:DRAWTO 0,90:DRAWTO 134,90
1035 PLOT 159,70:DRAWTO 159,93:DRAWTO 134,93:DRAWTO 134,90
1040 COLOR 2:PLOT 34,40:DRAWTO 34,20:DRAWTO 14,20
1045 POKE 765,1
1050 POSITION 14,40:XIO 18,#6,0,0,"S:"
1060 PLOT 80,80:DRAWTO 80,82
1065 PLOT 134,73:DRAWTO 134,89
1070 PLOT 34,40:DRAWTO 54,40:PLOT 44,30:DRAWTO 64,30:DRAWTO 64,60:PLOT 54,30:DRAWTO 54,20
1080 PLOT 34,60:DRAWTO 54,60:DRAWTO 54,50:PLOT 44,40:DRAWTO 44,50
1090 PLOT 44,10:DRAWTO 44,20:PLOT 64,10:DRAWTO 64,20
1100 PLOT 34,80:DRAWTO 104,80
1110 PLOT 44,70:DRAWTO 94,70:PLOT 74,70:DRAWTO 74,50:DRAWTO 84,50
1120 DRAWTO 84,30:PLOT 74,40:DRAWTO 74,20:DRAWTO 84,20:PLOT 84,60:DRAWTO 94,60
1130 PLOT 94,10:DRAWTO 94,30:PLOT 64,40:DRAWTO 104,40:PLOT 104,20:DRAWTO 104,30:PLOT 104,80:DRAWTO 104,70
1140 PLOT 114,40:DRAWTO 114,60:PLOT 104,70:DRAWTO 159,70:PLOT 140,60:DRAWTO 159,60
1150 PLOT 124,60:DRAWTO 124,40:DRAWTO 134,40:DRAWTO 134,20:PLOT 124,20:DRAWTO 124,30:PLOT 134,70
1155 DRAWTO 134,50:DRAWTO 146,50
1160 PLOT 34,80:DRAWTO 34,50:DRAWTO 14,50
1170 POSITION 14,80:POKE 765,1:XIO 18,#6,0,0,"S:"
1180 PLOT 114,40:DRAWTO 114,30:DRAWTO 104,30
1190 POSITION 104,40:POKE 765,1:XIO 18,#6,0,0,"S:"
1195 PLOT 60,90:DRAWTO 60,88
1200 PLOT 104,60:DRAWTO 104,50:DRAWTO 94,50
1210 POSITION 94,60:POKE 765,1:XIO 18,#6,0,0,"S:"
1215 PLOT 0,70:DRAWTO 7,70:PLOT 14,80:DRAWTO 7,80
1220 PLOT 124,20:DRAWTO 124,10:DRAWTO 114,10
1230 POSITION 114,20:POKE 765,1:XIO 18,#6,0,0,"S:"
1240 PLOT 14,80:DRAWTO 34,80:PLOT 14,40:DRAWTO 34,40:PLOT 114,20:DRAWTO 124,20
1245 PLOT 104,40:DRAWTO 114,40:PLOT 34,60:DRAWTO 104,60
1250 PLOT 126,70:DRAWTO 126,80:PLOT 116,80:DRAWTO 116,90
1300 RETURN
1500 GRAPHICS 17:SETCOLOR 4,15,15
1520 POKE 53248,5:POKE 53249,5
1530 POSITION 2,4:? #6;"TOO LATE----"
1535 FOR V=1 TO 3:SOUND 0,40,10,12:SOUND 1,150,10,12:SOUND 2,75,10,12:FOR W=1 TO 200:NEXT W
1536 FOR S=0 TO 3:SOUND S,0,0,0:NEXT S
1537 FOR W=1 TO 50:NEXT W:NEXT V
1540 FOR W=1 TO 200:NEXT W
1550 POSITION 2,6:? #6;"YOU'RE OUT"
1560 POSITION 2,8:? #6;"OF TIME!"
1562 FOR W=1 TO 500:NEXT W
1565 POSITION 2,10:? #6;"press trigger"
1570 POSITION 2,12:? #6;"to restart"
1580 IF STRIG(0)=1 THEN 1580
1590 GOTO 20
1700 SOUND 0,140,10,12:SOUND 1,50,2,12:FOR W=1 TO 150:NEXT W:SOUND 0,0,0,0:SOUND 1,0,0,0
1710 GRAPHICS 17:SETCOLOR 4,8,12
1720 POKE 53248,5
1725 POKE 53249,5
1730 POSITION 2,4:? #6;"YOU CAN'T STOP!"
1740 FOR W=1 TO 500:NEXT W
1750 POSITION 2,6:? #6;"KEEP MOVING!!"
1755 FOR W=1 TO 300:NEXT W
1760 POSITION 2,8:? #6;"   try again"
1770 FOR W=1 TO 500:NEXT W
1780 POSITION 2,12:? #6;"PRESS TRIGGER"
1785 POSITION 3,10:? #6;"TO RESTART"
1790 IF STRIG(0)=1 THEN 1790
1799 GOTO 20
2000 POKE 53248,5:POKE 53249,5
2005 SOUND 1,12,130,10:FOR W=1 TO 100:NEXT W:SOUND 1,0,0,0
2010 GRAPHICS 17:SETCOLOR 4,10,12
2020 POSITION 2,4:? #6;"THE RADIATION"
2025 POSITION 2,6:? #6;"IN THE WALLS"
2030 POSITION 2,8:? #6;"GOT YOU!!!"
2035 FOR W=1 TO 500:NEXT W
2040 POSITION 2,10:? #6;"PRESS TRIGGER"
2050 POSITION 2,12:? #6;"TO RESTART""
2090 IF STRIG(0)=1 THEN 2090
2100 GOTO 20
3000 REM DISPLAYLIST & TITLE
3020 GRAPHICS 2+16:SETCOLOR 4,0,12
3150 FOR W=1 TO 400:NEXT W
3160 COLOR 2
3200 POSITION 6,5:? #6;"airlock"
3250 SOUND 0,200,10,15:SOUND 1,255,10,18
3260 SOUND 2,80,10,15:SOUND 3,150,10,15
3270 FOR W=1 TO 20:NEXT W
```



Illustration: Jon Davis

```
3290 FOR H=0 TO 3:SOUND H,0,0,0:NEXT H
3295 FOR W=1 TO 500:NEXT W
3300 POSITION 2,9:? #6;"PRESS TRIGGER TO
"
3305 POSITION 7,11:? #6;"START"
3310 IF STRIG(0)=1 THEN 3310
3500 RETURN
4000 C=0:X=50:Y=95:HITCLR=53278
4001 POKE 53246,5
4002 A=PEEK(106)-24:POKE 54279,A:PMBASE=
256*A
4015 GRAPHICS 7+16:SETCOLOR 4,6,11:SETCO
LOR 0,4,4:SETCOLOR 2,7,8
4020 START=PEEK(560)+PEEK(561)*256+4
4025 POKE START-1,66:POKE START+2,2
4030 POKE START+149,65:POKE START+150,PE
EK(560):POKE START+151,PEEK(561)
4050 GOSUB 7000
4060 POKE 559,46:POKE 53277,3:POKE 53249
,X
4070 FOR J=PMBASE+640 TO PMBASE+748:POKE
 J,0:NEXT J
4080 POKE 705,54:FOR J=PMBASE+640+Y TO P
MBASE+644+Y:READ A:POKE J,A:NEXT J
4090 DATA 10,28,40,8,20
4100 RESTORE (4090)
4102 E=0:POKE 623,4
4103 POKE HITCLR,0
4105 A=STICK(0)
4110 E=E+1:IF E>70 THEN 1700
4150 IF A=15 THEN 4105
4155 C=C+1:IF C>250 THEN 1500
4160 IF A=9 OR A=10 OR A=11 THEN X=X-2:P
OKE 53249,X
4170 IF A=5 OR A=6 OR A=7 THEN X=X+2:POK
E 53249,X
4180 IF A=5 OR A=13 OR A=9 THEN FOR J=10
 TO 0 STEP -1:POKE PMBASE+640+Y+J,PEEK(P
MBASE+638+Y+J):NEXT J:Y=Y+2
4190 IF A=6 OR A=14 OR A=10 THEN FOR J=0
 TO 10:POKE PMBASE+638+Y+J,PEEK(PMBASE+6
40+Y+J):NEXT J:Y=Y-2
4200 L=PEEK(53253):IF L<>0 THEN 2000
4220 SOUND 0,140,10,4:FOR W=1 TO 5:NEXT
W:SOUND 0,0,0,0
4300 D=3:G=INT(2*RND(1)+3):IF G=4 THEN D
=4
4320 GOSUB INT(RND(1)*26)*10+8000
4350 IF Y<30 THEN GOTO 7500
4500 GOTO 4102
5000 COLOR D:PLOT 14,41:DRAWTO 14,49:RET
URN
5010 COLOR D:PLOT 34,41:DRAWTO 34,49:RET
URN
5020 COLOR D:PLOT 54,41:DRAWTO 54,49:RET
URN
5030 COLOR D:PLOT 55,60:DRAWTO 63,60:RET
URN
5040 COLOR D:PLOT 65,40:DRAWTO 73,40:RET
URN
5050 COLOR D:PLOT 74,41:DRAWTO 74,49:RET
URN
5060 COLOR D:PLOT 35,30:DRAWTO 43,30:RET
URN
5070 COLOR D:PLOT 44,21:DRAWTO 44,29:RET
URN
5080 COLOR D:PLOT 64,21:DRAWTO 64,29:RET
URN
5090 COLOR D:PLOT 84,51:DRAWTO 84,59:RET
URN
5100 COLOR D:PLOT 115,40:DRAWTO 123,40:R
ETURN
5110 COLOR D:PLOT 124,31:DRAWTO 124,39:R
ETURN
5120 COLOR D:PLOT 134,41:DRAWTO 134,49:R
ETURN
5130 COLOR D:PLOT 135,40:DRAWTO 143,40:R
ETURN
5140 COLOR D:PLOT 124,61:DRAWTO 124,69:R
ETURN
5150 COLOR D:PLOT 85,20:DRAWTO 93,20:RET
URN
5160 COLOR D:PLOT 105,20:DRAWTO 113,20:R
ETURN
7000 REM MAZE 2
7005 COLOR 1
7010 PLOT 0,70:DRAWTO 4,70:DRAWTO 4,60:D
RAWTO 4,20
7020 DRAWTO 40,20:DRAWTO 40,10:DRAWTO 14
0,10:DRAWTO 140,50:DRAWTO 152,50
7025 PLOT 20,50:DRAWTO 20,86:DRAWTO 60,8
6
7030 PLOT 0,80:DRAWTO 14,80:DRAWTO 14,50
:PLOT 60,86:DRAWTO 60,88:DRAWTO 84,88:DR
AWTO 100,76:DRAWTO 110,76
7035 PLOT 82,86:DRAWTO 82,88:PLOT 130,84
:DRAWTO 130,86
7040 PLOT 120,56:DRAWTO 120,86:DRAWTO 15
4,86:DRAWTO 154,76:DRAWTO 150,70
7050 DRAWTO 150,60:DRAWTO 159,60:DRAWTO
159,40:DRAWTO 150,40:DRAWTO 150,10:DRAWT
O 159,10
7055 COLOR 3
7060 PLOT 120,86:DRAWTO 120,76:DRAWTO 11
0,76
7065 POKE 765,2
7070 POSITION 110,86:XIO 18,#6,0,0,"S:"
7080 PLOT 20,50:DRAWTO 20,30:DRAWTO 14,3
0
7085 POKE 765,2
7090 POSITION 14,50:XIO 18,#6,0,0,"S:"
7100 PLOT 20,30:DRAWTO 30,30:PLOT 20,50:
DRAWTO 30,50:PLOT 30,40:DRAWTO 40,40:DRA
WTO 40,50
7105 PLOT 140,58:DRAWTO 140,60:DRAWTO 14
2,60:PLOT 140,34:DRAWTO 144,34
7110 PLOT 30,60:DRAWTO 60,60:DRAWTO 60,5
```



```
0:DRAWTO 80,50:PLOT 70,60:DRAWTO 80,60
7115 PLOT 46,76:DRAWTO 46,78:PLOT 138,46
:DRAWTO 138,48:PLOT 140,76:DRAWTO 144,78
7120 PLOT 50,20:DRAWTO 50,50:PLOT 40,30:
DRAWTO 50,30
7125 PLOT 148,70:DRAWTO 150,70:PLOT 150,
40:DRAWTO 150,42
7130 PLOT 80,40:DRAWTO 62,30:DRAWTO 60,3
0
7135 POKE 765,2
7140 POSITION 60,40:XIO 18,#6,0,0,"S:"
7150 PLOT 60,76:DRAWTO 60,70:DRAWTO 30,7
0
7155 POKE 765,2
7160 POSITION 30,76:XIO 18,#6,0,0,"S:"
7170 PLOT 60,10:DRAWTO 60,20:DRAWTO 66,2
0:DRAWTO 80,28:DRAWTO 80,16:DRAWTO 100,1
6:DRAWTO 100,28
7175 PLOT 125,46:DRAWTO 125,50
7180 PLOT 100,24:DRAWTO 120,24:DRAWTO 12
0,10:PLOT 90,26:DRAWTO 90,40:PLOT 90,60:
DRAWTO 90,70
7190 PLOT 80,78:DRAWTO 90,70:DRAWTO 70,7
0
7195 POKE 765,2
7200 POSITION 70,78:XIO 18,#6,0,0,"S:"
7210 PLOT 110,46:DRAWTO 110,34:DRAWTO 13
0,34:DRAWTO 130,20:PLOT 140,46:DRAWTO 12
0,46:DRAWTO 120,40
7215 PLOT 130,34:DRAWTO 130,38
7220 PLOT 90,50:DRAWTO 100,50:PLOT 100,3
8:DRAWTO 100,56:PLOT 150,70:DRAWTO 148,7
0
7230 PLOT 110,66:DRAWTO 110,56:DRAWTO 10
0,56
7235 POKE 765,2
7240 POSITION 100,66:XIO 18,#6,0,0,"S:"
7250 PLOT 140,76:DRAWTO 134,60:DRAWTO 13
0,60
7255 POKE 765,2
7260 POSITION 130,76:XIO 18,#6,0,0,"S:"
7270 PLOT 140,60:DRAWTO 132,56:DRAWTO 13
0,56
7275 POKE 765,2
7280 POSITION 130,60:XIO 18,#6,0,0,"S:"
7290 PLOT 14,50:DRAWTO 20,50:PLOT 30,76:
DRAWTO 60,76:PLOT 70,78:DRAWTO 80,78
7300 PLOT 100,66:DRAWTO 110,66:PLOT 110,
86:DRAWTO 120,86:PLOT 60,40:DRAWTO 80,40
7310 PLOT 130,76:DRAWTO 140,76
7400 RETURN
7500 GRAPHICS 17:SETCOLOR 4,10,12
7505 POKE 53249,5
7510 POSITION 2,4:? #6;"CONGRATULATIONS!
!"
7520 FOR W=1 TO 300:NEXT W
7530 POSITION 4,8:? #6;"YOU ESCAPED--"
7540 FOR W=1 TO 300:NEXT W
7550 POSITION 3,12:? #6;"press trigger"
7560 POSITION 4,13:? #6;"to restart"
7570 IF STRIG(0)=1 THEN 7570
7600 GOTO 5
8000 COLOR D:PLOT 21,60:DRAWTO 29,60:RET
URN
8010 COLOR D:PLOT 30,61:DRAWTO 30,69:RET
URN
8020 COLOR D:PLOT 31,50:DRAWTO 39,50:RET
URN
8030 COLOR D:PLOT 30,31:DRAWTO 30,39:RET
URN
8040 COLOR D:PLOT 40,31:DRAWTO 40,39:RET
URN
8050 COLOR D:PLOT 51,20:DRAWTO 59,20:RET
URN
8060 COLOR D:PLOT 50,51:DRAWTO 50,59:RET
URN
8070 COLOR D:PLOT 61,70:DRAWTO 69,70:RET
URN
8080 COLOR D:PLOT 80,29:DRAWTO 80,39:RET
URN
8090 COLOR D:PLOT 80,41:DRAWTO 80,49:RET
URN
8100 COLOR D:PLOT 80,51:DRAWTO 80,59:RET
URN
8110 COLOR D:PLOT 70,79:DRAWTO 70,87:RET
URN
8120 COLOR D:PLOT 81,60:DRAWTO 89,60:RET
URN
8130 COLOR D:PLOT 90,41:DRAWTO 90,49:RET
URN
8140 COLOR D:PLOT 100,29:DRAWTO 100,37:R
ETURN
8150 COLOR D:PLOT 111,46:DRAWTO 119,46:R
ETURN
8160 COLOR D:PLOT 111,56:DRAWTO 119,56:R
ETURN
8170 COLOR D:PLOT 140,51:DRAWTO 140,59:R
ETURN
8180 COLOR D:PLOT 140,77:DRAWTO 140,85:R
ETURN
8190 COLOR D:PLOT 141,30:DRAWTO 149,30:R
ETURN
8200 COLOR D:PLOT 110,47:DRAWTO 110,55:R
ETURN
8210 COLOR D:PLOT 141,10:DRAWTO 149,10:R
ETURN
8220 COLOR D:PLOT 50,77:DRAWTO 50,85:RET
URN
8230 COLOR D:PLOT 30,77:DRAWTO 30,85:RET
URN
8240 COLOR D:PLOT 60,61:DRAWTO 60,69:RET
URN
8250 COLOR D:PLOT 131,20:DRAWTO 139,20:R
ETURN
8300 REM DONE!
```



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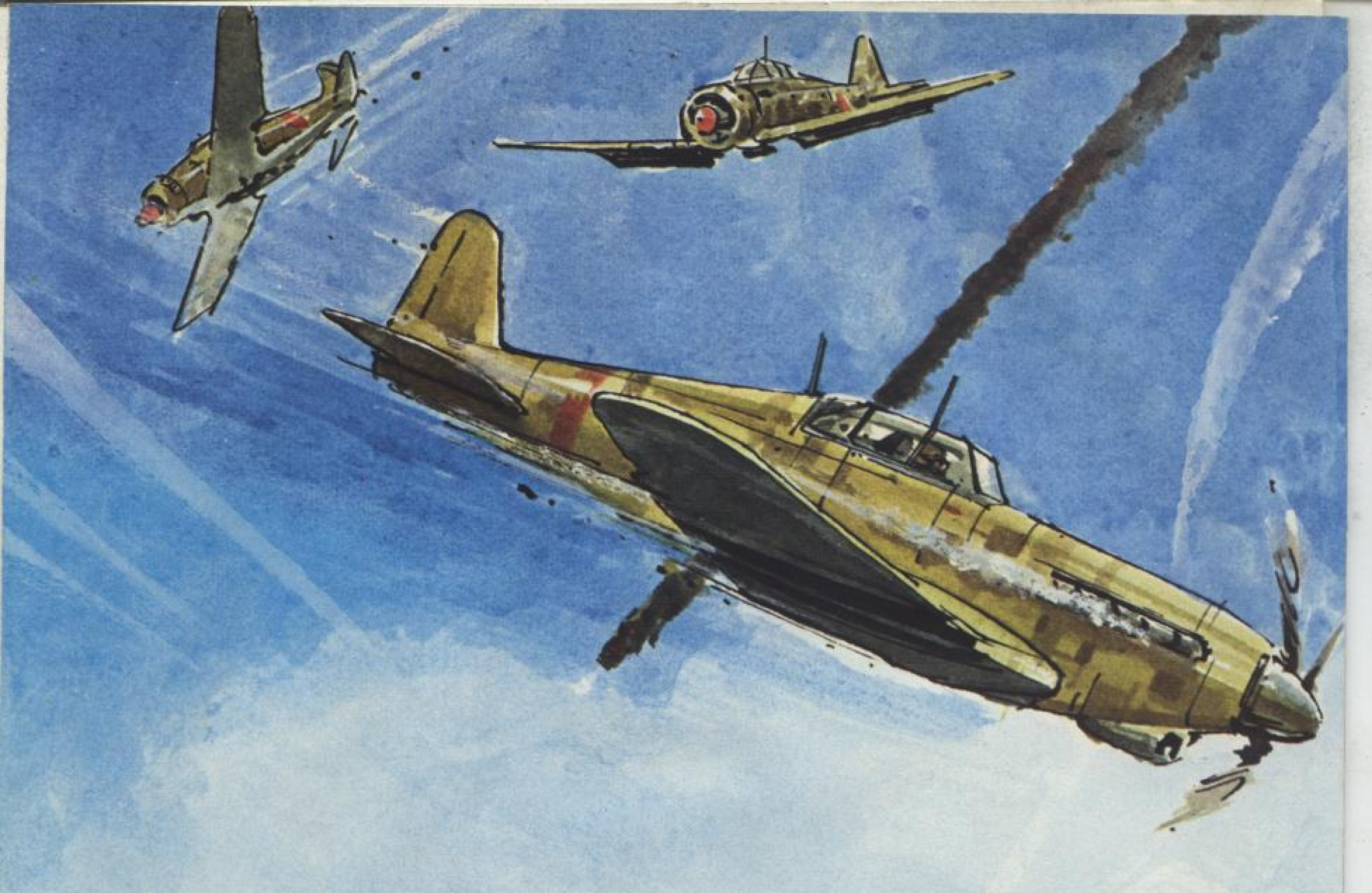
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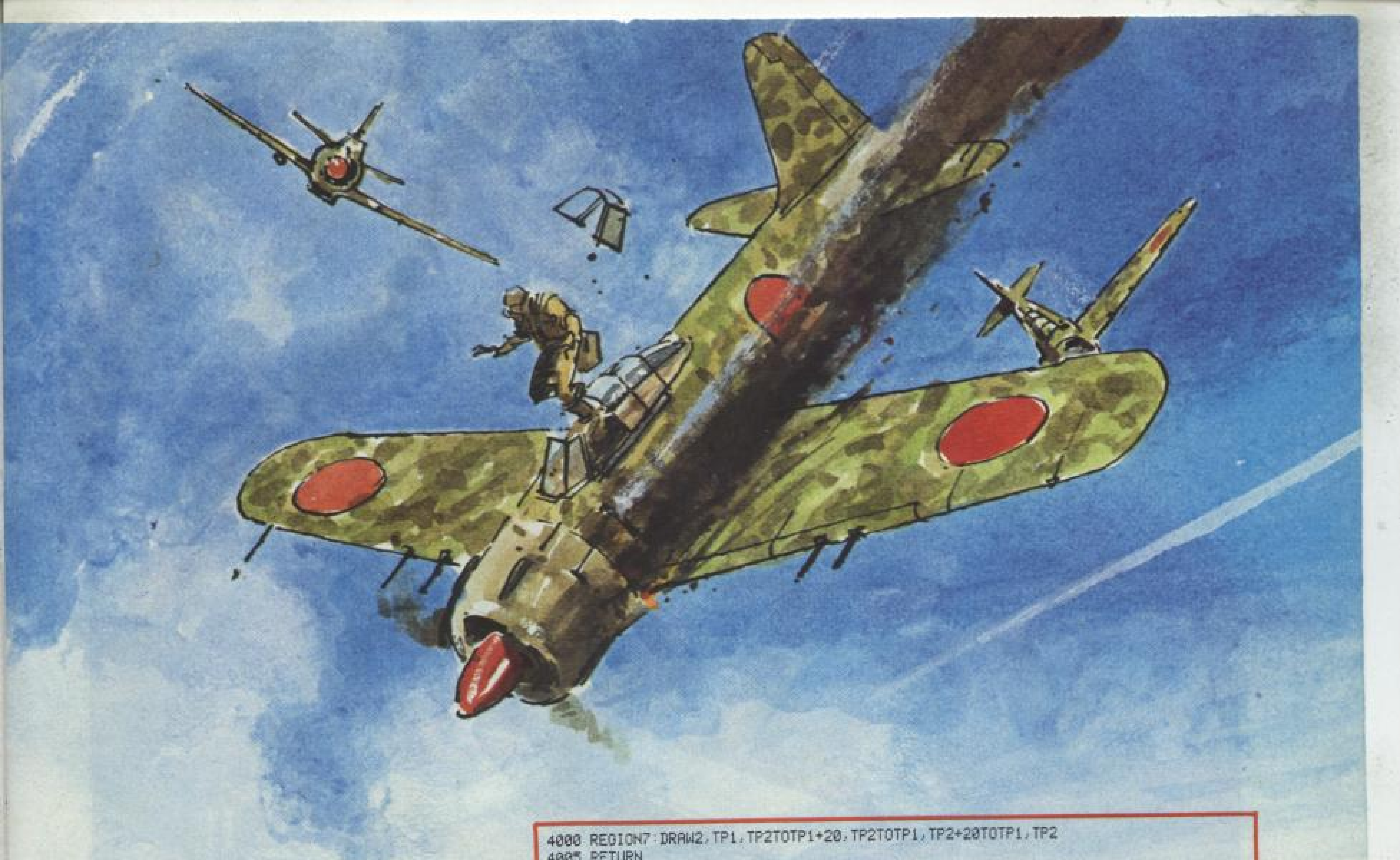


DOGFIGHT

```
1 REM DOGFIGHT BY        RICHARD BARTON.1982
2 REM VIC20 WITH 1211A 3K HI-RES CARTRIDGE   AND JOYSTICK CONTROL
4 GOSUB10000
10 SC=0:PL=0:TI$="000000"
20 X=730:Y=730:ES=195:GF=0
25 REM TARGET POSITION
26 TP1=INT(RND(1)*1000)+70:TP2=INT(RND(1)*700):PL=PL+1
27 GOSUB4000
28 IFTI$>"000200"THEN20000
40 S=RJOY(0)
41 POKEV,4:POKES1,ES:POKES2,ES+2
43 POKES4,0
44 REM FLIGHT CONTROL
45 IFS=128ORS>128THENGOSUB500
46 IFS=0THENX=X:Y=Y
50 IFS=8ORS=8+128THENB=1
52 IFB=1THENX=X+100:Y=Y-100:TP1=TP1-100
60 IFS=4ORS=4+128THENB=2
62 IFB=2THENX=X-100:Y=Y+100:TP1=TP1+100
67 IFS=1ORS=1+128THENB=3
68 IFB=3THENX=X-100:Y=Y-100:ES=ES+1:TP2=TP2-100
69 IFES>243THEN1000
70 IFS=2ORS=2+128THENB=4
72 IFB=4THENX=X+100:Y=Y+100:ES=ES-1:TP2=TP2+100
74 IFB=4ANDX<=0ORB=4ANDY<=0THENES=ES-6
76 IFTP1<60ORTP1>1023THEN26
77 IFTP2<0ORTP2>1023THEN26
82 IFX<0THENX=0
84 IFY<0THENY=0
90 IFES<180THENGOSUB30000
100 GRAPHIC2
103 SCNCLR
104 REM ALTIMETER
105 CHAR0,0,"9":CHAR9,0,"5":CHAR18,0,"0"
106 REGION1:DRAW2,60,0TO60,1023
108 DRAW2,0,-1500+(ES*10)TO60,-1500+(ES*10)
```

```
109 COLOR0,2,7,1
110 IFX>1020THENX=1020:IFY>1020THENY=1020
111 REM HORIZON
112 DRAW2,73,XTO1023,Y
115 DRAW2,500,1023TO500,970
120 GOTO27
420 POKES4,0
499 REM GUN FIRING
500 POKEV,10
520 POKES4,200:GF=GF+1
523 REGION2
524 DRAW2,500,970TO500,0
525 REM HIT DETECTOR
526 IFTP1>480ANDTP1<550ANDS>=128THEN6000
550 RETURN
999 REM CRASH SEQUENCE
1000 GRAPHIC0
1010 POKE36879,10
1020 FORI=22TO0STEP-1
1025 POKE36879,26
1030 POKE36864,12+I
1040 POKE36865,38+I
1050 POKE36866,150-I
1060 POKE36867,174-I*2
1070 NEXTI
1075 FORSO=14TO0STEP-.1
1078 POKEV,SO
1080 POKES4,200:POKES1,128:POKES2,128
1090 NEXTSO
1100 FORT=1TO500:NEXTT
1110 PRINT"[illegible]CRASHED-ANOTHER GO?"
1115 PRINT"[illegible]Y/N"
1120 GETA$:IFA$=""THEN1120
1130 IFA$="Y"THEN10
1140 END
3999 REM TARGET                GENERATOR
```

Illustration: Jon Davis



RUNS ON A VIC 20 WITH VIC 1211A HIGH-RES CARTRIDGE AND JOYSTICK CONTROLLER.

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```
4000 REGION7:DRAW2,TP1,TP2TOTP1+20,TP2TOTP1,TP2+20TOTP1,TP2
4005 RETURN
6000 SC=SC+1
6001 REGION7
6002 CIRCLE2,500,TP2,30,40
6004 POKES1,0:POKES2,0
6011 FOREX=15TO0STEP-.2
6012 POKEV,EX
6013 POKES1,128:POKES4,200
6014 DE=INT(RND(1)*150)
6015 DF=INT(RND(1)*150)
6016 POINT2,430+DE,430+DF
6019 NEXTEX
6020 FORT=1TO400:NEXTT
6030 GOTO26
9999 REM INTRODUCTION
10000 PRINT"■":POKE36879,26:PRINT"■■■■■■■■■■■DOGFIGHT"
10005 PRINT"■■■■■■■■BY R.BARTON"
10006 PRINT"■■■■■■■■■■■A HIT SCORES 1"
10010 S1=36874:S2=36875:S3=36876:S4=36877:V=36878
10012 POKEV,7
10014 READA
10016 POKES3,A
10017 READB
10018 IFB=-1THEN10030
10019 FORT=1TOB:NEXTT
10020 POKES3,0
10022 FORT=1TO20:NEXTT
10023 GOTO10014
10025 DATA195,200,201,80,195,150,207,80,209,80,215,200,219,80,215,250,0,50,219,1
50
10026 DATA228,150,219,150,215,150,207,150,201,80,195,80,207,150,219,150,0,-1
10030 POKES3,0
10090 RETURN
19999 REM END OF GAME
20000 GRAPHIC0
20001 POKES1,0:POKES2,0:POKES4,0
20005 POKE36879,122
20010 PRINT"■■■■YOUR SCORE WAS"
20020 PRINT"■■■■■■■■■"SC
20030 PRINT"■■■■PLANES DESTROYED"
20031 PRINT"■■■■AND■ "PL-SC"■ ESCAPED"
20032 PRINT"■■■■AND YOU FIRED                   ■■"GF"■ SHELLS"
20035 PRINT"■■■■■ANOTHER GO?  ■Y / N ■"
20040 GETA$:IFA$=""THEN20040
20050 IFA$="Y"THEN10
20060 END
29999 REM ENGINE STALL
30000 POKES1,0:POKES2,0
30010 EO=INT(RND(1)*20)
30015 FORT=1TOEO:NEXTT
30017 IFES<160THEN40000
30020 RETURN
40000 FORCP=ESTO244
40010 POKES1,CP:POKES2,CP+1:POKES3,CP+2
40020 NEXTCP
40030 GOTO1000
```



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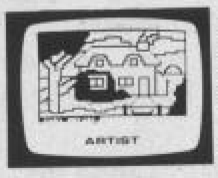
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GLUTTON



When there's a glut of dots around the screen you need to be feeling pretty hungry to munch your way into the clear.

Glutton is probably not a game to be played between meals. You take the part of a Billy Bunter character and are awarded points for the most dots you can eat. These are laid out in a Pacman type maze and of course you soon realise that you are not alone in the labyrinth!

There is something spooky in there with you, actually there's three of them and they are as hungry for you as you are for the edible dots.

When the player eats one of the larger dots on the course, he is transformed from the hunted to the hunter — making his pursuers change their shape and run away.

Fortunately, for the hungry player they also revert to half their normal pace. But watch out when they start to flash it's a sure sign that your meal is about to leap off the plate and start to feel a little hungry itself. It's time to start running again.

The program keeps a high score which is stored, allowing the program to be re-run without clearing the high score memory.

And it also makes use of a short machine code program which loads the contents off the screen so the maze can be drawn from memory rather than the tedious reading DATA.

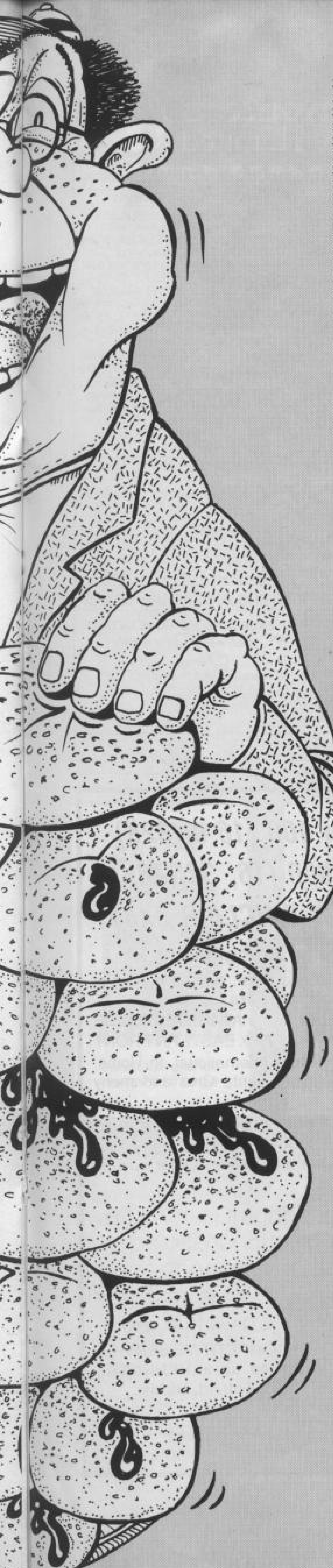
So if you're hungry for competition . . . start here.

RUNS ON A TRS-80 IN 16K

BY JASON MACHIN

```
10 CLS:PRINT'15,CHR$(23)"GLUTTON":PRINTTAB(8)STRING$(7,131):PRINT:
PRINTTAB(5)"BY J. MACHIN 23/5/82."
20 FORG=1TO500:NEXT
30 GOTO1310
40 POKE16561,177:POKE16562,123:CLEAR500:POKE16526,180:POKE16527,127
50 DEFINTA-Z
60 FORX=32692TO32711:READY:POKEX,Y:NEXT
70 DATA205,127,10,203,69,33,179,123,17,64,60,1,192,3,40,1,235,237,176,201
80 DATA63,19,3,9,3,9,3,19,3,3,3,3,3,9,3,9,3,9,3,3,3,3,3,1,3,3,3,3,3,3,3,9,3,9,3,
3,3,3,3,3,3,1,3,3,3,9,6,3,9,3,6,9,3,3,3,1,3,3,3,3,3,33,3,3,3,3,3,1,3,9,3,3,3,3,1
5,3,3,3,3,9,3,1,3,3,3,9,3,3,15,3,3,9,3,3,3,1,
90 DATAGLUTTON," ",RUN FROM THE GHOSTS COLLECTING AS MANY '.' AS YOU CAN,"IF THE
 GHOSTS CATCH YOU, YOU WILL LOSE A LIFE.",TO SAVE YOURSELF THERE ARE LARGER DOTS
 WHICH ALLOW YOU TO,"CHASE THE GHOSTS. BUT BE CAREFUL, THE EFFECTS OF THE",LARGE
 DOT SOON WEAR OFF
100 DATA" ",PLAY TO SCORE POINTS                    ,SMALL DOTS 30 POINTS,LARGE DOT 30
0 POINTS,GHOSTS MYSTERY SCORE," ",MOVE YOURSELF WITH THE ARROW KEYS.,
110 Y$(0,1)=CHR$(174)+CHR$(188)+CHR$(157)
120 Y$(1,1)=CHR$(174)+CHR$(191)+CHR$(179)
130 Y$(2,1)=CHR$(174)+CHR$(143)+CHR$(157)
140 Y$(3,1)=CHR$(179)+CHR$(191)+CHR$(157)
150 FORD=0TO4:Y$(D,0)=CHR$(174)+CHR$(191)+CHR$(157):NEXT
160 G$=CHR$(182)+CHR$(143)+CHR$(185)
170 R$=")`("
180 IFNOT(PEEK(32000)=191ANDPEEK(32001)=191)THENPOKE31000,0:POKE31001,0
190 POKE15405,51:DEFINTA-Z:DEFSNGS,E
200 PRINT@0,"   SCORE 00         HIGH SCORE 000000     LIVES";
210 E=PEEK(31000)+PEEK(31001)*256
220 PRINT@30,;:PRINTUSING"#####";E;:PRINT@30,STRING$(6-LEN(STR$(E)),"0")
```

Illustration: Dorian Cross



```
230 Q=15410:IFSPRINT@8,S;
240 IFPEEK(Q)=91THENQ=Q+1:GOTO240ELSEPOKEQ,91
250 IFPEEK(32000)=191ANDPEEK(32001)=191THENX=USR(0):GOTO320
260 C=191
270 READA:IFA=0THEN300
280 PRINTSTRING$(A,C);:IFC=191THENC=128ELSEC=191
290 GOTO270
300 FORY=64TO448STEP64:FORX=0TO62
310 POKE16384-Y+X,PEEK(Y+X+15360):NEXT:NEXT
320 PRINT@262,STRING$(3,128);:PRINT@822,STRING$(3,128);:FORY=15488TO16256STEP64:
FORX=1TO62STEP3
330 IFPEEK(X+Y)=128THENPOKEX+Y,46
340 NEXT:NEXT
350 PRINT@472,CHR$(191)STRING$(4,131)"      "STRING$(4,131)CHR$(191);
360 PRINT@536,CHR$(191)"              "CHR$(191);
370 PRINT@600,CHR$(191)STRING$(4,176)"      "STRING$(4,176)CHR$(191);
380 IFS>50000THEN400
390 POKE15492,140:POKE15854,140:POKE16314,140:POKE15952,140
400 POKE15838,128:POKE15966,128:POKE15902,128
410 POKE15489,76:POKE16257,76:POKE15549,82:POKE16317,82:POKE15551,32
420 ONINT(S/8000)+1GOTO440,450,460,470,480
430 GOTO480
440 POKE16031,140
450 POKE15775,140
460 POKE15516,140
470 POKE16290,140
480 X=USR(1):C=15360:K=14400:Q=15361:B=164
490 Y=896:X=0:F=1
500 D=1
510 FORG=1TO3:X(G)=30:Y(G)=512:NEXT
520 GOTO710
600 P=PEEK(K):ONP/8GOTO620,630,710,640,710,710,710,650
610 GOTO710
620 D=0:M=-64:GOTO660
630 D=2:M=64:GOTO660
640 D=3:M=-3:GOTO660
650 D=1:M=3
660 IFPEEK(M+X+Y+Q)=128THEN720
670 Z=PEEK(M+X+Y+Q):IFZ=46THENS=S+30:POKEX+Y+M+31604,128:PRINT@8,S;:B=B-1:IFB=0T
HEN200ELSE720
680 IFZ=82THENX=0:GOTO730
690 IFZ=76THENX=60:GOTO730
700 IFZ=140THENS=S+300:POKEX+Y+M+31604,128:J=20:PRINT@8,S;:B=B-1:IFB=0THEN200ELS
E720
710 M=0
720 IFABS(M)=64THENY=Y+MELSEX=X+M
730 PRINT@X+Y,Y$(D,F);
800 IFJ=0THEN820
810 J=J-1:IFINT(J/2)<>J/2THENFORG=1TO100:NEXT:GOTO1120
820 FORG=1TO3:H=0:V=0:T=X(G)+Y(G)+C
830 IFX(G)>XTHENH=-3
840 IFX(G)<XTHENH=3
850 IFY(G)>YTHENV=-64
860 IFY(G)<YTHENV=64
870 IFT-C+V=X+YORT-C+H=X+YTHEN1200
880 IFJTHENH=-H:V=-V
890 IFPEEK(T+H)>128THENH=0
900 IFPEEK(T+V)>128THENV=0
910 IFH+V=0THEN950
920 IFH*V<>0THENIFRND(2)=1THENI=V:GOTO1040ELSEI=H:GOTO1040
930 IFH=0THENI=VELSEI=H
940 GOTO1040
950 ONRND(4)GOTO960,970,980,990
960 IFPEEK(T+3)<129THENI=3:GOTO1040
970 IFPEEK(T-3)<129THENI=-3:GOTO1040
980 IFPEEK(T+64)<129THENI=64:GOTO1040
990 IFPEEK(T-64)<129THENI=-64:GOTO1040
1000 IFPEEK(T+3)<129THENI=3:GOTO1040
1010 IFPEEK(T-3)<129THENI=-3:GOTO1040
1020 IFPEEK(T+64)<129THENI=64:GOTO1040
1030 GOTO1070
1040 IFPEEK(T+I)=32THEN1070
1050 IFABS(I)=3THENX(G)=X(G)+IELSEY(G)=Y(G)+I
1060 POKEX(G)+Y(G)+C,32
1070 NEXT
1100 IFJ>7GOTO1120
1110 Z=USR(0):FORG=1TO3:PRINT@X(G)+Y(G),G$;:NEXT:F=(F=1)+1:GOTO600
1120 Z=USR(0):FORG=1TO3:PRINT@X(G)+Y(G),R$;:NEXT:F=(F=1)+1:GOTO600
1200 IFJTHENL=100*(10-INT(J/2)):PRINT@X+Y-1,L;:S=S+L:FORN=1TO20:PRINT@X(G)+Y(G),
Y$(D,F);:FORZ=1TO20:NEXT:F=(F=1)+1:NEXT:X=X(G):Y=Y(G):M=0:Y(G)=512:X(G)=30:PRINT
@8,S;:GOTO720
1210 PRINT@X+Y+1,"@";:FORG=1TO400:NEXT
1220 PRINT@X+Y,")'(";:FORG=1TO400:NEXT
1230 PRINT@X+Y,CHR$(153);CHR$(179);CHR$(166);:FORG=1TO400:NEXT
1240 POKE15405,PEEK(15405)-1:IFPEEK(15405)>48THEN490
1250 PRINT@X+Y,"   ";:PRINT'539,"GAME OVER";
1260 IFS>ETHENPOKE31001,S/256:POKE31000,S-PEEK(31001)*256
1300 RESTORE
1310 READA:IFATHEN1310
1320 PRINT@960,:IFS=0CLS
1330 READA$:PRINTTAB(32-LEN(A$)/2);A$
1340 IFA$<>""THEN1330
1350 Z=0:A$=INKEY$
1360 Z=Z+1:IFZ<1000ANDINKEY$=""THEN1360
1370 IFZ=1000RUN
1380 RUN40
1390 GOTO600
```

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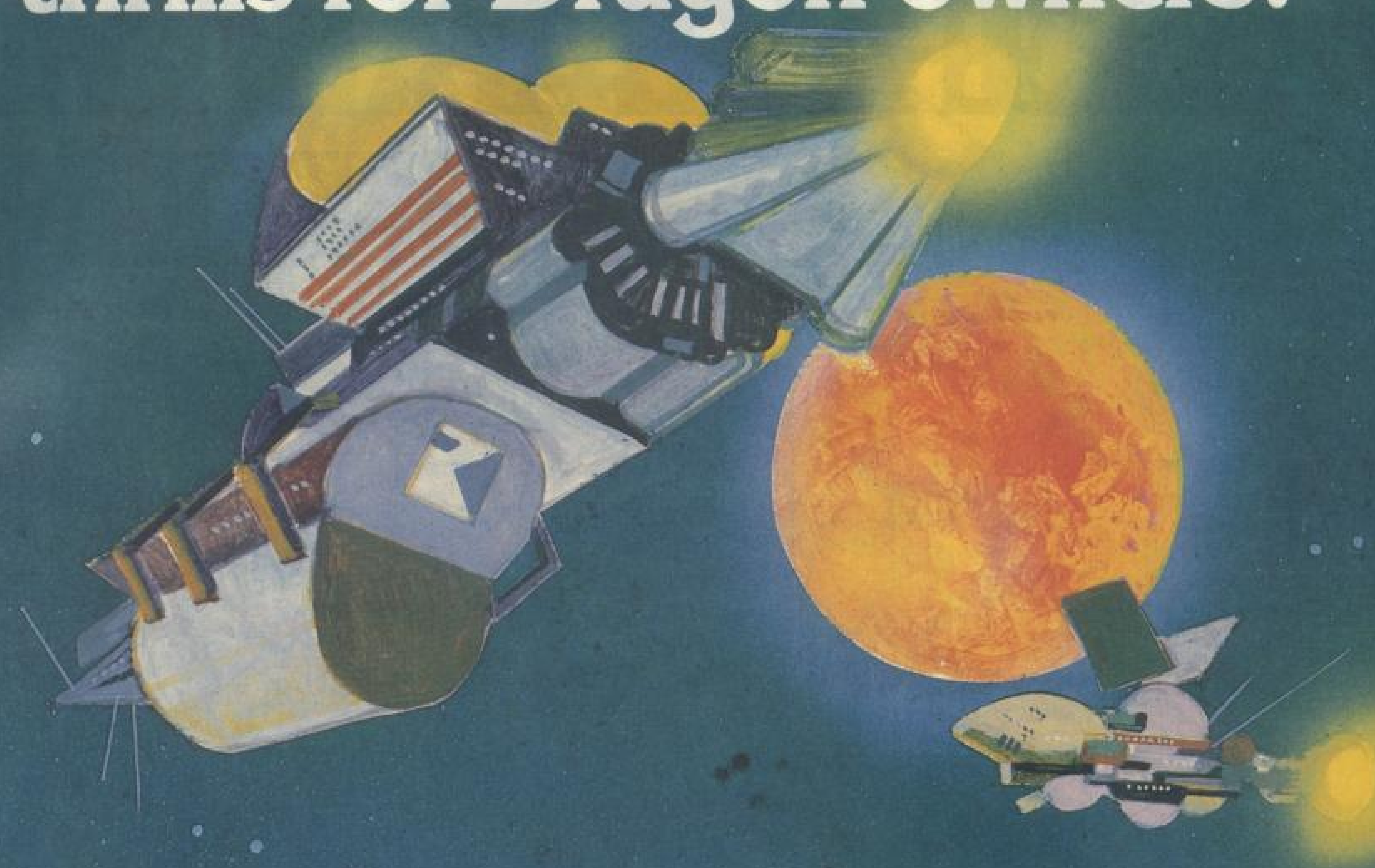
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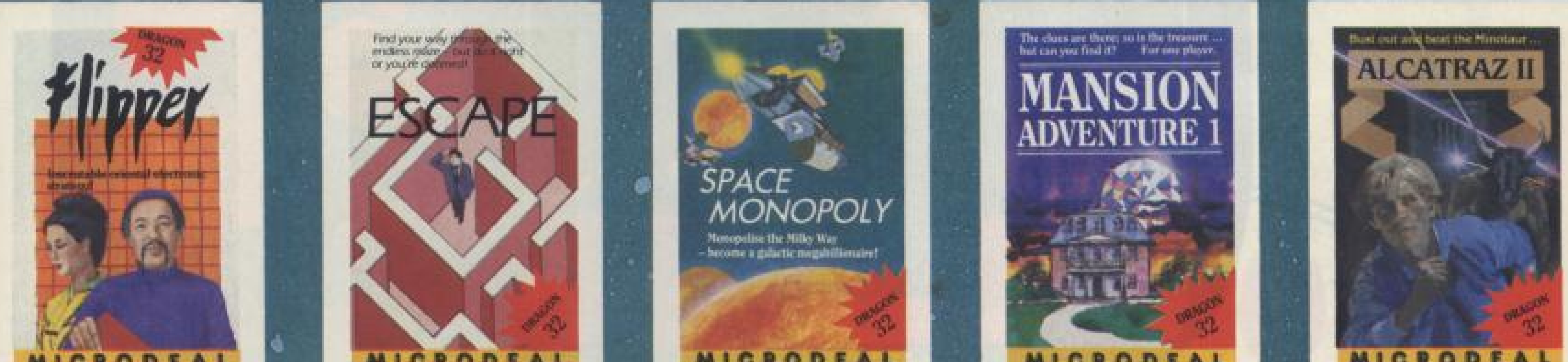
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THE SEVENTH EMPIRE

THE best way to learn history is from the crusted carapace of a Tiaithan. All the Shell Tribes share the same lyrical tones which turn Fivespeak into a language almost capable of poetry, but the Tiaitha, being Machen — data memorisers — can provide the fullest detail.

Perhaps it is just because I first heard the story of The Seventh Empire beside Tiaithan fires that I feel this way, but I still remember the night when their fleet put down in the plains beyond our cities.

Hakub I is the unromantic name for our planet, the only inhabitable planet in the Hakub System but rich in heavy metal and one of the first "greenhouse" planets to be seeded.

That moon phase the word had gone out that a Tiaithan Fleet had landed to trade and all the local merchants had rushed to greet them — they had come from a rich system.

I was taken out to see them on the third night. There was no current war in the system, and an eager crowd surrounded their fires as the wind swept through the plain and some 30 Tiaithans came out to recount the tale.

Someone beside me pointed out a group of Debeshi Pirates, whose craft landed close by, and who were mingling among us to hear the tale. Now I wonder how it was they weren't run off the planet, then I merely drank in the rich detail of the story telling and lost myself to the saga of D'Taan and her Rebel Empire.

She belonged to a human tribe — the Jellied Ones as the hard-skinned Shell People still call us — and was a lowly scientist on an exploration ship based in the Fanus System.

In those days the galaxy knew only five empires, communication between them was rare — as was interstellar travel — and only a handful of interpreters understood the now widespread Fivespeak language.

Stellar energy was the currency then and it was in the hands of the **Bloodline Empire** named after the species which dominated both that empire and the energy reserves. The Bloodline was the name given to a tribe of smooth-skinned reptiloids who could reproduce so accurately — cell-by-cell they claimed — that they were one of the few societies in the known galaxy never to have developed clones.



The Bloodline had been the first colonisers of the galaxy and had monopolised stellar energy reserves on the few planets which housed them. These were usually the hot heavily atmosphered greenhouse effect planets and few of these could be developed even by the hardy and technologically advanced Bloodline.

So, stellar energy was in short supply and that way the Bloodline claimed control over the inter-system travel and held the other four empires in check.

The Shell People, evolving swiftly out of their natural amphibious environments, were probably the biggest force in the collection of species known as the **Water Empire.**

We poor humans being too short-lived to achieve much as space travellers had still been able to establish colonies across great tracts of space using mercenary-controlled craft and suspended animation and had found a small voice among the creatures concerned with the physical sciences.

We were highly rated as colonisers as the least volatile of races and also for our suitability to colonise the group-B oxygen-atmosphere planets which produced the small amethyst-type gems used to harness the stellar energy. Ours was nicknamed the **Amethyst Empire.**

The smallest empire was the province of the sun beings. Only two species found their way to prominence through solar power and the **Sun Empire** was among the most elusive in the galaxy.

The largest empire in sheer weight of numbers were those from the frozen or dead planets who were equipped to survive environments where even the most technologically capable beings would not attempt to mine or set up colonies.

Many creatures had evolved in the **Dead Empire** but they were universally slow-witted and would have doubtless been amalgamated by a more go-ahead rival if any had seen much use to be made of the dead planets. None did and so by default the **Dead Empire** came into existence and earned a galactic voice.

So each empire found its own niche in the galactic system, their dependents seldom straying from their own environment and never indulging in travel beyond their own solar system without the grudgingly given energy of the Bloodline.

Despite the seeming rich variety of creatures, there was still much of the galaxy which was without inhabitants or prospects. Diverse as galactic kind was, it still only occupied a narrow band of planet and star systems.

Of these the greenhouse effect planets with their ability to produce the stellar energy and rich seams of heavier metals were regarded the deepest loss.

The Sun Polyps were a well known but little investigated phenomena. Consisting of little more than a few cells they inhabitated the very edge of planetary atmospheres in their trillions.

D'Taan was investigating them for her tribe, colonists of a Bloodline controlled solar system. Little importance was attached to her work, she hoped to discover how the creatures had managed such a widespread distribution over the galaxy.

A controlled colony was set up as part of her experiments on a new planet — just beyond the life ring — too close to its star to have anything really worthy of the name atmosphere.



Illustration: Dorian Cross



As luck would have it, D'Taan had chosen a creation generation to transfer and when the exploration ship called back five solar years later, the planet, classified as Solar Desert Type-B had grown cloud cover.

A shuttle sent to the planet's surface came down in the middle of a rain storm and, while the heat was such that only a sun-being could have stood it unsuited, the atmosphere was doing its work. Of the polyps there was no sign — they had gone into catatonic generation and died out.

D'Taan was quick to realise the importance of the discovery, Bezel, the Gorgan captain of her craft was quicker. He stopped the news being keyed into the ship computer which was transmitting all experimental data to the nearest space station, from where it would be sent to Bloodline databanks.

D'Taan's work had told her something about the polyps' four generation evolution cycle. She estimated a Creation Generation occured every 50 solar years.

And her other experiments had shown that only creation generation polyps actually survived the transmission to a new planet — and then only for a few years.

A brief discussion with Bezel convinced D'Taan that the Bloodline would put a stop to her work to preserve their galactic control. They had to break the bounds of the Bloodline Empire and make for an uninhabited system with polyps of a different generation. They needed stellar energy quickly.

The raid on the Bloodline space station in the Janus system was when piracy first came home to roost in the galaxy.

Prior to that, the stellar energy had been under such control that none could make good their escape to a new system. Janus was not an energy system but it did have a small supply which Bezel knew was kept on the station for passing inter-system Bloodline freighters.

It was only Bezel's inside knowledge of the station which made the raid possible. As it was there was just enough power to rush them into the neighbouring system of Vepoz.

Uninhabitable with four planets, said the exploration charts. But it had everything D'Taan needed to continue her next experiment, polyps had been charted on a dead planet, and there was an unstable greenhouse effect class C planetoid closest to the sun — rich in stellar energy which no one could currently mine.

Armed with a cryogenic chamber and a desperate hope that by the time an intersystem Bloodline cruiser reached Janus, their trail would be cold, Bezel put the craft in orbit around the polyp's planet and the crew to sleep until D'Taan's estimated creation generation came round.

The creation generation reached maturity, was duly transfered to Vepoz I and after five further years in the "freezer", Bezel and D'Taan had a stable planet shielded from the sun's rays by a growing atmosphere and that elixir of all life, water. But more important they had access to stellar energy.

The **Pirate Empire** was born over the next years, fuelled by stellar energy and run by Bezel, it struck where it wanted, turned two further planets into stellar supporters and ran the other empires and the Bloodline ragged.



D'Taan split from Bezel, who threatened to rule the galaxy in his lifetime and continued her experiments with polyps while on the run from the Bloodline and most of the other empires, stirred up by her former colleague's atrocities.

There were many questions still unanswered about polyps but the two most important for D'Taan were: why a colony artificially transfered to a new planet always died out and her original puzzle; how could the polyps be so widespread over the galaxy.

The answer lay in the pattern of distribution which she mapped out from stolen empire surveys of the charted systems. Polyp colonies always seemed to spread outwards from a Neutron Star system.

Neutron Stars, are stars whose energy has been spent and the mass has folded in on itself, the density and gravitational pull of these dead suns caused strange effects on space and they were avoided as navigational hazards. Could they so distort space as to allow travel through to other Neutron Stars.

D'Taan's mind struck upon an ancient hypothesis. Space was curved but how curved? Could there be areas which pulled by the distortion almost doubled back on themselves.

If you looked at the universe as a ring with two planes then a simple twist would turn that ring into a mobius strip with just one plane.

Take that twist into a third or even fourth dimension and then what would you have? black holes rent the fabric of the universe, perhaps a Neutron Star was also capable of this, pulling great folds of universal fabric around it and perhaps matter could punch its way through to a part of the galaxy which was light years away by normal means.

Seven years D'Taan spent on the problem before a Bloodline ship finally tracked down her craft and seized herself and the crew. She was frozen and taken back to Grakta, whose voice was loudest of the Five Empires which, split by Bezel's pirates, were now at war with one another.

She was taken into the presence of mighty lizard who had spoken for the Bloodline Empire for over eight generations of himself, no-one but Bloodliners themselves knowing when one Grakta died and the next took his place. With him was a token representative of the Dead Empire, — his only current ally — an ice warrior there as a symbol, whose name was never asked or recorded.

Death was the sentence for unleashing anarchy on the galaxy and creating the sixth Pirate Empire. But D'Taan still had an ace to play, Gateway Stars. She outlined her experiments to a disbelieving Grakta and showed him a way to defeat Bezel's ambitions.



Grakta scoffed but she persevered and demanded two things in return for the secret of the Gateways across the known galaxy. She wanted an empire herself, named after her and devoted to science. And she wanted the secret of the Gateways to be shared across the empires so that none would have the advantage over the other that the Bloodline had enjoyed for so long.

"No", was Grakta's answer. "You die and we fight the pirates as best we can." They were the last words he spoke as an ice warrior's tribal axe buried itself deep in his back. It was the only time that an emissary from those Dead Planet's had acted so swiftly and so decisively.

The ice warrior turned to D'Taan: "You shall have your request and Bezel shall lose his advantage over us".

The Dead Empire, armed with the science of **D'Taan's newfound Empire** and backed by the Sun Empire's solar troops, met and defeated Bezel at a mighty battle in the Yuses system.

A conquered Bezel sought out his conquerors and the Treaty of the Seven Empires was sworn. It split the galaxy's habitable systems between all seven, it restricted any tribe to no more than seven space fleets, so that no army might ever again grow to threaten the whole empire and it allowed for the inevitable bickering and warfare which would break out.

Most important was the Dead Empire's insistence that the empires be disbanded and that the peoples of the galaxy revert to the tribes and species from which they had come. There was compromise and the empires ended up as figure heads, destined in the course of time to be given into the hands of seven computer controlled ships which react to the data the tribes affiliated to planets in each empire feed into them.

That was the saga of D'Taan, who died before the battle of Yuses, as told to me by the Tiaitha one magical night on the plains of Hakub I.

Fitting because D'Taan's sun polyps seeded the atmosphere of Hakub I releasing its stellar energy to the miners and colonisers and merchants, of which I am now one.

The Seven Empires are torn by war and rivalry. Piracy is rife, raiding an everyday part of interstellar life and loyalty to anything beyond your own tribe rare.

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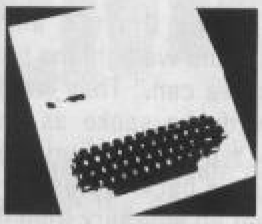
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Adventure

THE SANITY CLAUSE . . .

My sanity now partially restored with some help from our readers, I feel it is about time to tell all about Asylum.

This game by Frank Corr, like Deathmaze, features a graphic maze with movement through it controlled by arrow keys, combined with typed commands in English.

However, there the similarity to Deathmaze ends. Asylum accepts whole sentences rather than two-word commands. The corridors are lined with doors which can be seen to be open or closed.

Most of the doors are locked. Some locks can be picked, others unlocked by a specific key. Guards can be seen barring the way at strategic points — try to pass them at your peril!

When the game commences the player finds himself locked in a cell with nothing but a hand-grenade to keep him company. Yes — if handled wrongly it WILL blow up!.

There is nothing for it but to find a way to escape from the cell. Should the player be recaptured, he will find he must escape again, this time by a different method.

Then what? How is it possible to break further into the game with those guards on each corner? This is the point at which I nearly went mad a few months ago! I was not the only one — Steve Gamble from Sheffield wrote in desperation asking me to pass on any useful tips I might receive from helpful readers. He even offered to take out an additional mortgage on his house to pay for such advice!

Fear not, Steve! *Computer & Video Games* readers have come to our rescue! R. W. Patterson of Silcoates School in Wrenthorpe suggested that the guard should be approached with the confidence of a hedgehog trying to overturn a speeding juggernaut.

Tiptoe, turn and face the guard and punch him, was his advice. Then frisk him, he suggested, and watch the startling metamorphosis as he turns into a box containing useful objects! Well, the last bit was OK, but the first few moves didn't quite seem to work out.

Mr P. A. Ellis of Wrexham was more explicit in how to get to the frisking stage. For readers whc are as desperate as Steve and myself, I have encoded the instructions — to protect those of sound mind — in a Basic program listing. Type it in and run it to obtain the tips.

Having successfully got past the guard and armed with a brass key, I managed to free an inmate who proved to be an expert locksmith. The trouble is, he was also a chain smoker, and got quite nasty without a regular 'fix'. I was getting on reasonably well with my new found friend when suddenly and without warning he pushed me into a maze.

Mr. Ellis has obviously got beyond this point as he ended his letter with meaningless questions like "How do you get the hanger off the inmate after the second maze?".

Never mind the second maze, Mr. Ellis, how do you get out of the first one? Mr. Ellis didn't tell me any more for fear of spoiling my game!!.

Eventually I found my own favourite ending! Try this one Steve, and your worries will be over. Go into the first door on the right from the left-hand entrance to the guards quarters. There you will be welcomed in for a lobotomy.

Before you can decline, the screen will clear with a message: 'You are now very calm'.

Asylum runs on a TRS-80 or Video Genie in 16k

I often get desperate letters from readers for a solution to a particular problem in an Adventure which is baffling them and preventing further exploration.

Whilst I am happy to help — if I can! — no doubt many readers would rather not see the solution, preferring to battle on themselves. Therefore I have written some tips in code to help solve the problems that seem to be bugging most Adventurers who write in.

To decode the solutions, type in and run the decoding program provided. The program will call for lines of coded text to be input. When this has all been entered, type 'E'. After a short delay, the message will be displayed in clear language on the screen.

```
100 REM COMPUTER & VIDEO GAMES
110 REM ADVENTURE TIPS DECODE PROGRAM
120 REM BY KEITH CAMPBELL
130 CLS : PRINT"TYPE <E> WHEN DATA ENTRY
COMPLETE"
140 FOR I = 0 TO 10
150 PRINT"ENTER LINE NO.";I+1
160 INPUTA$(I)
170 IF A$(I) = "E" THEN 190
180 NEXT
190 FOR I = 0 TO 10
200 IF A$(I) = "E" THEN 280
210 FOR J = 1 TO LEN(A$(I))
220 Z = ASC(MID$(A$(I),J,1))
230 IF Z = 59 THEN Z = 0
240 IF Z = 64 THEN Z = 44
250 Z = Z + 32
260 B$(I) = B$(I) + CHR$(Z)
270 NEXT J : NEXT I
280 CLS : FOR I = 0 TO 10
290 IF A$(I) = "E" THEN END
300 PRINT B$(I) : NEXT I
```

```
BEAT THE GUARDS IN ASYLUM

45%-!2)'(4;/54;/&;'5!2$;/&&)£%3;£/22)$/2
34/)!/,%;0!£%;&2/-;£/2,%2
490%;7!0+;15)%4!09
02/£%%$;4/;&!£%;'5!2$
490%;()4;'5!2$;7)4(;'2%,!$%
ESCAPE THE BEAR IN SAVAGE ISLAND PART 1

/.;*%!£(;$)';(/0%;7)4(;(!.$3
4!+%;*/440%;4/;£!6%
%-049;25-;).;34/.%;*!3).
&)00;*/440%;7)4(;3%!;7!4%2;&2/-;4)$%0//0
0/52;7!4%2;/.;0%$'%;/543)$%;£!6%
7()4;&/2;05$$0%;4/;%6!0/2!4%
')6%;3!0$;4/;*%!2
./4%;*%!2;0)+%3;3!0$;).;37%!4
GET PAST SERPENT IN TANDY PYRAMID

9/5;-534;(!6%;*)2$;34!45%
'%4;4()3;*9;£!229).';/,09;*/0
).;£(!-*%2;7)4(;3%20%.4;4(2/7;*)2$
*)2$;7)00;!44!£+;3%20%.4;!.$;$2)6%;)4;/&&
```

In suggesting ways that an Adventure might be programmed, I have quite frequently used FOR-NEXT loops to scan strings and arrays to identify words. For example where X$ is the string to be searched and Y$ is the trial string:

```
10 J=0: For I = 1 to LEN (X$) STEP LEN
(Y$)
20 IF MID$ (X$, I, 3) = Y$ THEN J = I:
GOTO 100
30 NEXT
100 REM VALID WORD STARTS AT
THE JTH POS'N
```

If the word is found, control jumps out of the FOR-NEXT loop to line 100.

This usually causes no problems on most machines, although it can corrupt the "stack".

The stack normally concerns only the Assembly language programmer, but it can get corrupted from Basic, causing unpredictable results.

You will probably only get these problems if the loops are nested and buried in subroutines, but the extent to which you can 'get away with it' will also depend on which machine you have.

For instance, the BBC micro will not permit a jump out unless the FOR variable is equated to the TO value, whereas the TRS-80 is much more easy going.

The whole point of jumping out, of course, is that once the required value has been identified, no additional time is required to complete the loop, thus speeding up program execution.

If you run into FOR-NEXT problems that are apparently inexplicable, examine your coding to see if the loop is being exited before completion. If so-you may have to revise your program thus:

```
10 J = 0 : FOR I = 1 TO LEN(X$) STEP
LEN(Y$)
20 IF MID$(X$, I, 3) = Y$ THEN J= I
30 NEXT : GOTO 100
100 REM VALID WORD STARTS AT
THE JTH POS'N
```

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GO GO GO

Let's see what proverbs we can devise for a simple extension to the program outlined in the previous Go articles. We got as far as random selection of a move within a set of boundary intersections.

Each boundary intersection is defined as being next (considering up to the nearest eight intersections) to both a black and a white stone — see figure 1.

"Don't play where you can get captured next move" is rather an obvious maxim. All the points marked A fall into this category and therefore should be eliminated from the set of boundary intersections.

Then there is the well known proverb — *"Your best play is often your opponent's best play"*. The logical converse of this proverb is *"Your worst play is often your opponent's worst play"*. By this token the point marked B should also be eliminated — if it's a bad move for your opponent it's a bad move for you.

Having eliminated some bad moves, let us now move on to rank the remaining possibilities. We have a choice of optimising for defence or for attack. Since you are never so vulnerable as when you attack inexpertly, and considering our program's capabilities (so far) we shall tackle defence first.

A main tactic of attack is to isolate your opponent's groups by placing stones where those groups would otherwise join. Small groups have fewer liberties (adjacent vacant intersections) and so are easier to kill.

The moves to isolate stones are called "cuts" and "peeps". The white stone at E7 in figure 1 is an example of a peep.

A further move by white at E8 would seriously threaten the life of the four black stones to the left. A black stone placed at B2 is an example of a cut.

It separates the one white stone from the two above. *"Block peeps and cuts"* is advice well worth taking. In our defensive posture we will give such moves priority.

Even though a group might be cut off from another, it can still make territory and avoid capture if it gains enough liberties. Thus we should try to observe the proverb

The rules of play are very simple so you might expect that a few golden principles would enable a computer program to play well. Not so! Nevertheless there are hundreds of books on how to play Go — a fair number of them, English translations from the original Japanese. So surely it must be a matter of transferring the book knowledge into the computer and hey presto!

The trouble is that the proverbs, maxims and hints are all couched in far from concrete terms. Take the proverb *"Play away from your opponent's strength."* All very well but exactly how far away? How do you judge the strength of your opponent's positions? And then there are the inevitable exceptions to the rule to ponder! The most important Go proverb of them all is *"Don't follow Go proverbs blindly!"*

— *"Maximise the liberties of your groups"*. We can do this by awarding higher priority to moves that gain more liberties.

Even with these proverbs, carefully selected for ease of implementation, there still remains a fair amount of design acumen needed to keep the programming simple and efficient.

The selection table defines a pattern recognition method which falls short of obeying the proverbs to perfection but does cover most situations.

The intersections next to each boundary intersection are examined to see which is the first pattern to match and then the appropriate action is taken.

For example we could hold the first pattern as a byte string with values representing the matching instructions W, N/B, W, X, N/B, X, W, B.

Starting with North and proceeding in a clockwise direction each intersection is matched against the appropriate instruction. If all succeed i.e. North holds a white stone, North-East does not hold a black stone etc., the appropriate action is taken.

At the first failure the next pattern must be examined or at least the same pattern in the next of its four orientations. This can be done by starting with the East intersection. Note that N/B and N/W instructions include off board imaginary intersections so that points at the edge of the board can be matched against the same patterns.

Thus N/B means white, vacant or off board, and N/W means black, vacant or off board. By matching the patterns in this fashion it is possible to hold all the patterns in 88 bytes.

Figure 2 shows the final rankings.

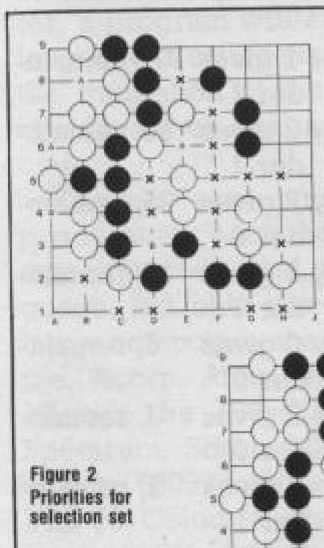


Figure 1
Computer — black
Human — white
A&B points eliminated
Points marked X remain

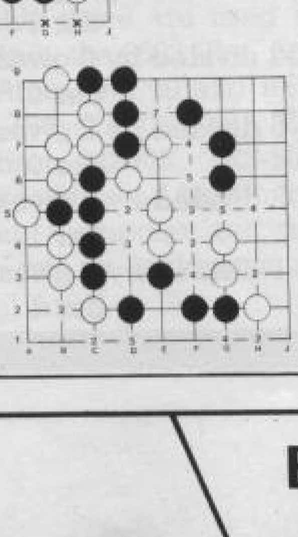


Figure 2
Priorities for selection set

Selection Table

Pattern						Action
B	W	N/B	N/B	W	B	Eliminate
W		W	W		W	from
X	N/B	X	X	N/B	X	selection
W	B	N/W	N/W	B	W	Eliminate
B		B	B		B	from
X	N/W	X	X	N/W	X	selection
X	W	X	W	B	X	Priority
B		B	B		N/W	= 7
X	X	X	X	N/B	X	
N/B	B	N/B				Priority=
X	X				3+	
X	X	X				liberties
B	B	N/B	N/B	B	B	Priority=
X		X	X	X	2+	
X	X	X	X	X	X	liberties
B	B	B				Priority=
X		X				1+
X	X	X				liberties
X	N/B	X				Priority=
N/B		N/B				liberties
X	N/B	X				

KEY: B must be black
N/B mustn't be black
W must be white
N/B mustn't be white
X don't care

NOTES:
. Take 1st match in strict order
2. N/B N/W include off board intersections

BY ALLAN SCARFF

MACHINE CODE

TRY THE GO FASTER CODE

Home computers are designed to make it easy for us to type in, list, edit, save, load, and run Basic programs.

It is so easy to use Basic on these machines that we need a very good reason to take the trouble of using any other programming language.

The most common reason for getting away from Basic is that it is too slow for some applications; moving graphics in interactive action games, the calculation of the computer's move in complicated strategy games, and the searching of large amounts of data in Adventure-type games are just a few examples.

The fastest response that can be obtained from a computer comes from machine code, but before we look at what this means we need a little background information on number systems and the internal organisation of a computer.

With ordinary decimal numbers, we use a positional principle in order to represent numbers of any size by combinations of 10 different digits, 0, 1, 2, . . . , 9. The amount a digit contributes to the number depends on the position of the digit; the rightmost digit represents units, the next digit to the left represents 10s, the next digit to that represents hundreds, and so on. The decimal number 203 thus means two hundreds plus no 10s plus three units.



We can use the same idea with other numbers than 10; if we use 2 instead of 10 we only need two digits, 0 and 1, and the positions of the digits, counting from the right represent units, twos, fours, eights, sixteens, etc, each position counting for twice as much as the position immediately to the right. Thus, the *binary* number 11001011 means one 128, plus one 64, plus no 32s, plus no 16s, plus one 8, plus no 4s, plus one 2 plus one 1, which works out to the decimal number 203.

We can convert numbers from binary to decimal as in the example above, by adding the position values for the 1s in the binary number. To convert from decimal to binary we divide by 2, recording the result and remainder, and repeat the process on the result until we reach zero; the remainders in reserve order give the binary number. To illustrate this, let us look at the conversion of decimal 203 to binary:

203 divided by 2 gives 101, remainder 1
101 divided by 2 gives 50, remainder 1
50 divided by 2 gives 25, remainder 0
25 divided by 2 gives 12, remainder 1
12 divided by 2 gives 6, remainder 0
6 divided by 2 gives 3, remainder 0
3 divided by 2 gives 1, remainder 1
1 divided by 2 gives 0, remainder 1

Reading the column of remainders from bottom to top gives 11001011, the binary equivalent of the decimal number 203.

These strings of binary digits (or *bits*) are not easy to work with; we generally need to use binary numbers 8 or 16 bits long, and it is very difficult to remember them and to copy them correctly. To get numbers that are conveniently short we generally use *hexadecimal* or base 16 numbers. In base 16 we need 16 digits, from 0 to 15, and we use the letters A to F for the digit values from 10 to 15.

The digits have positional values as in decimal and binary, but this time the values are multiplied by 16 as we move to the left. To take an example, the hexadecimal number 1A30 means one 4096 plus ten 256s plus three 16s plus no 1s, which works out to 6704 in decimal.

For numbers up to decimal 15 we can convert between binary and hex (short for hexadecimal) by a simple table:

Decimal	Binary	Hex
0	0000	0
1	0001	1
2	0010	2
3	0011	3
4	0100	4
5	0101	5
6	0110	6
7	0111	7
8	1000	8
9	1001	9
10	1010	A
11	1011	B
12	1100	C
13	1101	D
14	1110	E
15	1111	F

We can also use this table in converting larger numbers between binary and hex.

To convert from hex to binary we simply replace each hex digit by the four binary digits from the table, for example, hex 1A30 becomes binary 0001101000110000. To convert from binary to hex, we divide the binary number into groups of four digits, from the right, and replace each group by the corresponding hex digit, for example binary 11001011 gives the two groups 1100 and 1011, so the hex equivalent is CB.

BY TED BALL

MACHINE CODE

Because of this direct conversion we can regard hexadecimal notation as an abbreviation for binary, and instead of 8 bit or 16 bit binary we can use 2 digit or 4 digit hex, which is much easier to use.

If we now look at the way a computer system is organised we can see why binary numbers are used. Figure 1 is a simple block diagram of a computer system CPU which stands for Central Processing Unit.

This is the part of the computer that does all the calculations and in a microcomputer the CPU is a single integrated circuit called a *microprocessor.*

operated by the presence or absence of a voltage. We can thus represent the data bus by an 8-bit binary number and the address bus by a 16-bit binary number, where a 1 means there is a voltage on the line and a 0 means there is no voltage on the line.

Machine code programs are actually patterns of 1s and 0s in the memory, which we represent as binary numbers (or in abbreviated form as hexadecimal numbers). The processor can only work with these binary numbers, but it is almost impossible for human beings to do so.

To show what assembly language looks like and to see how completely different the three processors

```
6502
A902      LDA #2
18        CLC
6902      ADC #2
8D0010    STA $1000

Z80
3E02      LD A, 2
C602      ADD A, 2
320010    LD (1000H), A

6809
8602      LDA #2
8B02      ADDA #2
B71000    STA $1000
```

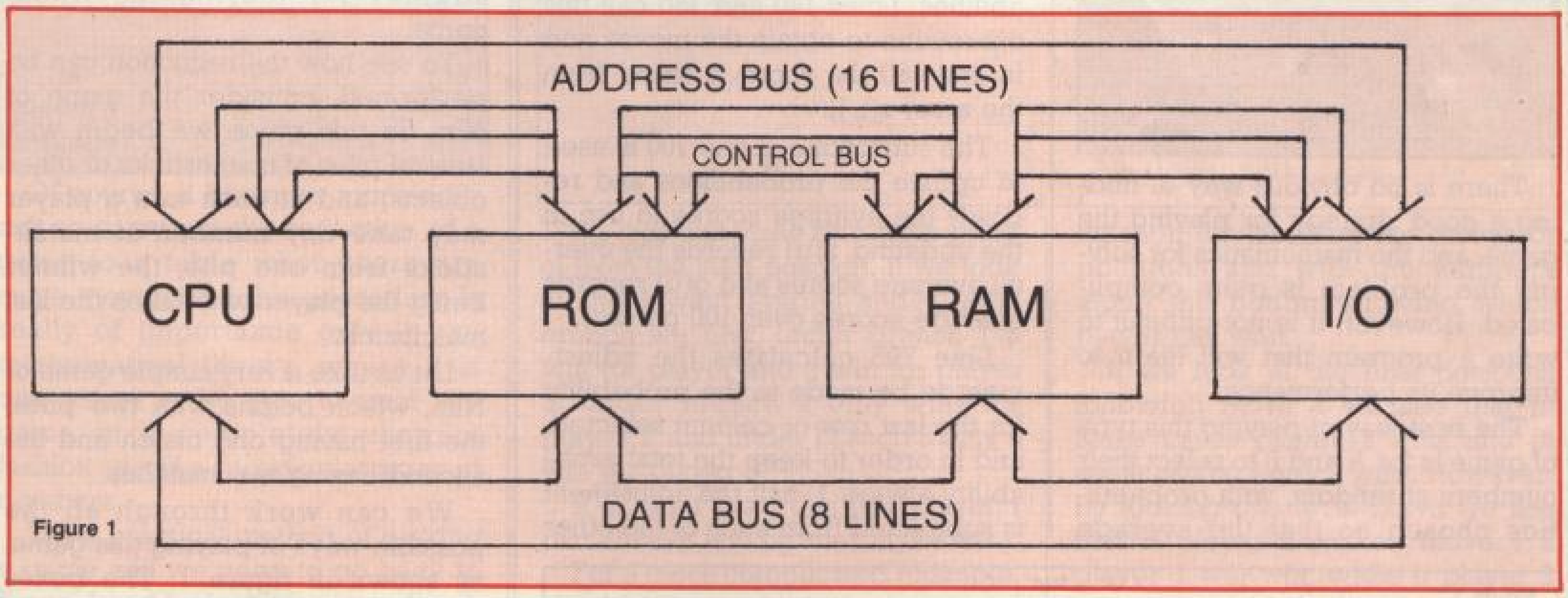


Figure 1

are, let us look at a simple program to add 2 and 2.

The object code (in hex) is on the left and the source code on the right.

In all three programs the same principle is used; load the number 2 into the processor, add 2, and finally store the result in memory location 1000 hex.

There are, however, several differences in the details of the source code.

Because the assembly languages are so different you will have to stick to learning just the one for the computer you have.

You will need a text book to refer to the precise details of the assembly language and the corresponding machine code.

There are many books available, some dealing with a particular model of computer and others dealing with the microprocessor without reference to any particular model.

ROM is Ready-Only Memory, and is used for permanent storage of programs and data; the Basic interpreter and all the control programs that make the computer work are stored in ROM.

RAM stands for Random Access Memory; the name does not describe the most important point, that it's possible to write new programs and data into the RAM. I/O stands for Input/Output, the connections between the computer and the outside world: keyboard, TV display, tape recorder, printer.

The various parts of the computer are joined into a single system by three sets of connections, the Control bus (which we can ignore as it cannot be affected by programming), the Address bus, and the Data bus (a *bus* is just a group of connections).

The home computers we are dealing with have eight data line and 16 address lines which are

We actually write our programs in a language that has meaningful names for the machine instructions and allows us to use meaningful names for our data, then we translate into the binary numbers the processor needs.

The meaningful language is called **assembly language** or **assembler,** a program written in assembly language is called **source code** and the translation of the source code into binary or hex is called **object code**

There are many microprocessors, each having its own machine code and assembly language, but only three are used in home computers: the 6502 (Pet, Apple, Acorn, Atom, Vic-20 and BBC Micro), the Z80 (ZX80, ZX81, ZX Spectrum, Sharp MZ80K, TRS-80), and the 6809 (so far used only in the TRS-80 Colour Computer and the Dragon). We will be looking at all three in detail later.

PRACTICAL PROGRAMMING

THE SEARCH FOR A GOOD STRATEGY

I have been looking at a table for a simple game. The game consists of two players, A and B, independently choosing one of the numbers 1, 2, 3. If they choose the same number B wins the amount of the chosen number otherwise A wins the amount of his number. This is equivalent to A choosing a row and B choosing a column from table one.

		B 1	B 2	B 3
A	1	−1	1	1
A	2	2	−2	2
A	3	3	3	−3

There is no obvious way of finding a good strategy for playing the game, and the mathematics for solving the problem is quite complicated. However, it is not difficult to write a program that will learn to improve its performance.

The best way of playing this type of game is for A and B to select their numbers at random, with probabilities chosen so that the average score is better than with any other probabilities.

Program 1 has been written to demonstrate the principle.

In order to keep the program simple and avoid obscuring the principle I have used a simple method for adjusting the probabilities, which will not work correctly all the time, and I have omitted any checks to prevent the probabilities from becoming greater than 1 or less than 0.

The probabilities are set at 1/3 to begin with, and the subroutine beginning at line 500 selects a number 1, 2, or 3 with the appropriate probabilities. Lines 140 and 150 call this subroutine to obtain the moves and in line 160 the score is found from the array s(i, j).

The subroutine at line 700 is used to update the probabilities and records the average scores to use in the updating. a(u) records the overall average scores and g(u) records average scores over 100 games.

Line 705 calculates the adjustment to be made to the probability for the last row or column selected, and in order to keep the total probability always 1, half the adjustment is subtracted from each of the other two probabilities, in lines 740 and 745.

In the games we have looked at so far, each player makes only one move, and the two players make their moves simultaneously, without knowing the other players move. In most real games, each player will have to make several moves, and the players make their moves alternately and know all the previous moves.

However, it is always possible to reduce an extended game to the simple form of one move for each player, although in the reduced form a "move" actually consists of a strategy for playing the whole game.

To see how the reduction can be performed, consider the game of Nim. In this game we begin with several piles of matchsticks or other objects, and at each turn a player may take any number of matchsticks from one pile, the winner being the player who takes the last matchstick.

Let us take a very simple game of Nim, which begins with two piles, the first having one match and the second having two matches.

We can work through all the possible ways of playing this game, as shown in figure 1. The boxes show the position after each move and the numbers above the boxes can be used to refer to the moves.

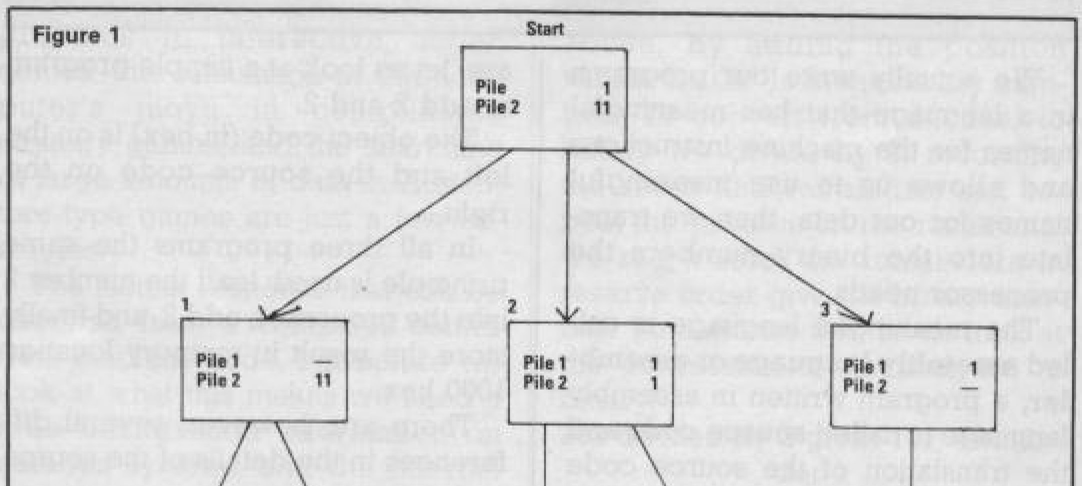
There are only three ways for the first player to play, because after the second player's move either the second player has won or there is only one match left and the first player has no choice for his second move.

There are four ways for the second player to play (these are plans for the whole game, not single moves) as follows:

1) If player 1 makes move 1, make move 1, 1
If player 1 makes move 2, make move 2, 1
If player 1 makes move 3, make move 3, 1

2) If player 1 makes move 1, make move 1, 1
If player 1 makes move 2, make move 2, 2
If player 1 makes move 3, make move 3, 1

Figure 1



BY TED BALL

3) If player 1 makes move 1, make move 1, 2
If player 2 makes move 2, make move 2, 1
If player 3 makes move 3, make move 3, 1
4) If player 1 makes move 1, make move 1, 2
If player 1 makes move 2, make move 2, 2
If player 1 makes move 3, make move 3, 1

We can now make up a table similar to those for the earlier games, with a 1 meaning a win for the first player and a −1 meaning a win for the second player:

		2nd player's strategy			
		1	2	3	4
1st	1	1	1	−1	−1
player's	2	1	1	1	1
strategy	3	−1	−1	−1	−1

Of course, it becomes more difficult to carry out the reduction of a game to a table when there are more moves, and this procedure is really of importance only in the mathematical theory, where it is convenient to be able to treat any game in a completely abstract fashion as just a rectangular array of numbers.

For a practical method of playing a game will we need to go back to figure 1 and look at it in more detail.

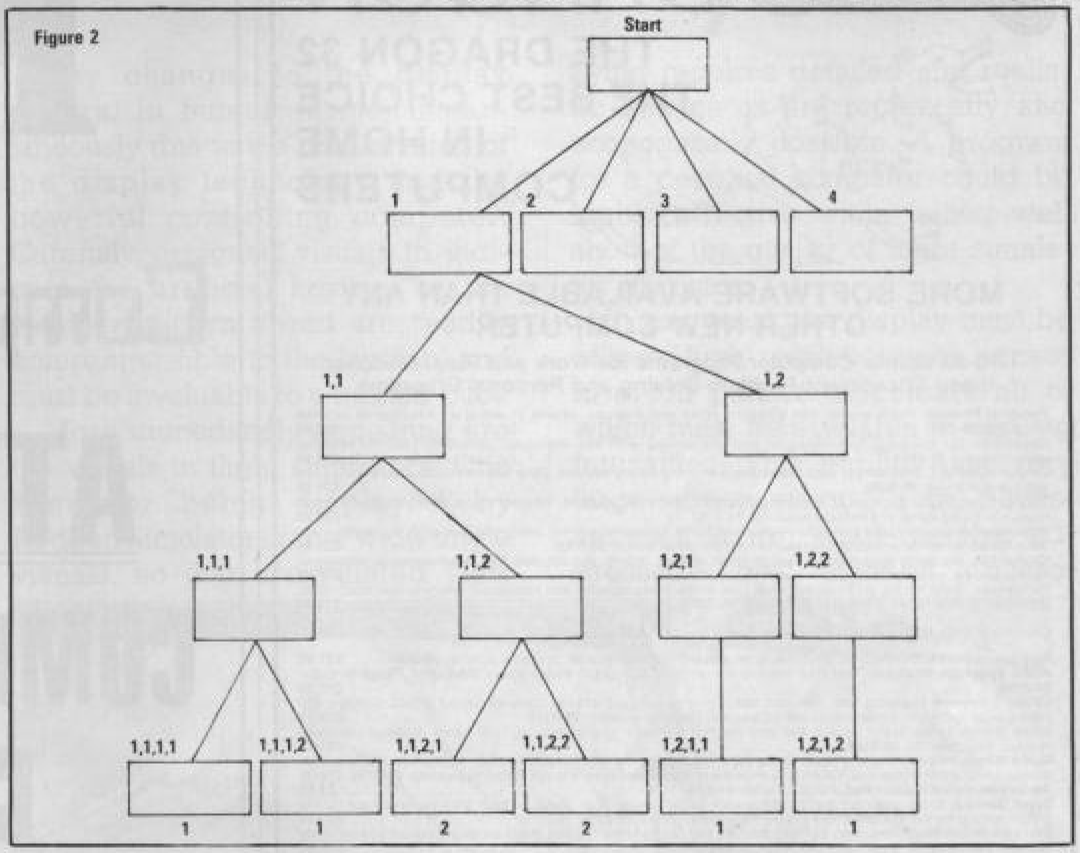
From the point of view of player 1, the tree has three branches going of from the start position. If we look at the lowest entries under each branch we find, under branch 1 a win for player and a win for player 2, under branch 2 only wins for player 1, and under branch 3 only a win for player 2.

It is clear from this that player 1 can always win by making move 2.

For a more complicated example, consider figure 2 which shows part of a larger tree, using the same notation for labelling the moves or positions and with the numbers along the bottom showing which player has won.

If we look at the final positions following move 1 we see that in some cases player 1 wins and in some cases player 2 wins. However, by looking one level down we see that if player 2 makes move 1, 2 player 1 will win, while if player 2 makes move 1, 1 player 1 can win by making move 1, 1, 1.

Figure 2




```
 10 DIM p(2,3): DIM g(2): DIM a
(2): DIM b(2)
 20 LET p(1,1)=.333: LET p(1,2)
=.333: LET p(1,3)=.334
 30 LET p(2,1)=.333: LET p(2,2)
=.333: LET p(2,3)=.334
 40 DIM s(3,3)
 50 FOR i=1 TO 3
 60 FOR j=1 TO 3
 70 READ s(i,j)
 80 NEXT j
 90 NEXT i
 100 LET y=0
 110 LET x=0
 120 LET x=x+1
 130 PRINT AT 0,0;y+x
 140 LET v=1: GO SUB 500: LET i=
u: REM Row player's move
 150 LET v=2: GO SUB 500: LET j=
u: REM Column player's move
 160 LET s=s(i,j)
 170 LET u=1: LET v=i: GO SUB 70
0: REM Update row probabilities
 180 LET s=-s
 190 LET u=2: LET v=j: GO SUB 70
0: REM Update col probabilities
 200 IF x/100<>INT (x/100) THEN
GO TO 120
 210 CLS
 220 PRINT AT 3,0;
 230 FOR u=1 TO 2
 240 FOR v=1 TO 3
 250 PRINT p(u,v);" ";
 260 NEXT v
 270 PRINT
 280 NEXT u
 290 LET y=y+100
 300 FOR u=1 TO 2
 310 LET b(u)=b(u)+g(u)
 320 LET a(u)=b(u)/y
 330 LET g(u)=0
 340 NEXT u
 350 GO TO 110
 500 LET p=0
 510 LET u=1
 520 LET r=RND
 530 FOR n=1 TO 2
 535 LET p=p+p(v,n)
 540 IF r>p THEN LET u=u+1
 550 NEXT n
 570 RETURN
 700 LET g(u)=g(u)+s
 705 LET d=.001*s*(a(u)-g(u)/x)
 710 LET p(u,v)=p(u,v)+d
 715 LET l=v+1
 720 IF l>3 THEN LET l=1
 725 LET m=l+1
 730 IF m>3 THEN LET m=1
 740 LET p(u,l)=p(u,l)-d/2
 745 LET p(u,m)=p(u,m)-d/2
 750 RETURN
 800 DATA -1,1,1,2,-2,2,3,3,-3
```



Graphics

LOOK MUM, NO WINGS

Along with about a quarter of a million other people, I went to Farnborough last month to see the flying display. The planes and the displays can provide the inspiration for computer games and a wealth of ideas for graphics — both static and mobile. Being able to see the planes, whether in the static display or in the air, reinforces very strongly the importance of being able to see a complex object from many different points of view in order to be able to appreciate its overall shape and structure, and hence perhaps its function. Only the combination of several rather special views of a plane such as the Rockwell B-1 can reveal the way in which its shape has been designed to reduce its visibility to radar systems. This kind of experience should inspire anyone to polish up his program for displaying three-dimensional shapes and using hidden line removal.

The exhibition of aviation hardware is vast, and it is surprising — although perhaps it should not be — to come across the names of firms familiar to users of personal computers — Thorn-EMI to name one.

What is particularly striking is the number of manufacturers displaying computers and video displays. The graphics capabilities being demonstrated by various manufacturers were quite remarkable, particularly by comparison with what is available for video games and personal computers.

The major applications for graphics were in instruments displays and simulation.

The most advanced instrument panel systems for aircraft cockpits all include a cathode-ray tube on which any individual instrument display can be shown as required. Raster-scan technology is naturally used to generate the display on the C.R.T., and the visual display is composed of dots, just as on a personal computer. However, liquid crystal display technology is used for the display surface.

Any changes to the display occurs, in human terms, instantaneously due to the combination of the display technology and the powerful controlling computer. Carefully designed visuals to indicate the artificial horizon or the weather pattern ahead are readily comprehensible to the layman, and must be invaluable to a trained pilot.

More immediately appealing are the visuals in flight simulators. One simulator being displayed by Redifon Simulators gave wide-angle visuals, so that a simulated view from the cockpit is provided for all the windows. The visuals representing airports in all conditions from daylight to darkness, and including in between, dusk and foggy conditions, are realistic and convincing.

If personal computers are to be able to display the sort of graphics used in flight simulators advances are needed in both hardware and software compared to what is generally available now. This begs the question of whether it is necessary to reproduce the graphics precisely on a personal computer.

To convince a pilot in a simulator to take his experience seriously and make him believe he is actually flying requires detailed and realistic images as are technically and economically possible. A program for a personal computer could be highly effective while falling well short of the quality of flight simulator graphics.

In any event, the display must be of very high resolution with access to a full palette of colours all of which must be available in varying intensities. This implies that very large screen memories are necessary — larger than can be addressed by eight-bit microprocessors — so that a 16-bit machine is needed. It would be needed to produce realistic mobile graphics with such images.



The programming expertise necessary to write programs generating such graphics is mostly contained within the companies involved in making the simulators.

The only program known to me that has graphics remotely approaching the level of flight simulators is a Jumbo jet landing program for the Atari. The Atari machines, incidentally are probably the only current personal computers able to display the necessary images.

As all this graphics capability and technology already exists in the aviation world, there is no reason why it should not be borrowed and adapted by the games and computing sector, as long as it can be delivered at the right price.

Illustration: Jon Davis

BY GARRY MARSHALL

SANTA'S CHOICE

RADIO CONTROL

In the early days of radio controlled cars, the returns rate was nothing less than horrendous. This was due to many problems but was not helped by the customer having to pay out upwards of £10 for batteries and a licence to be able to play with the vehicle.

Initially, British suppliers (most imported the vehicles) rushed into this area and failed to check quality and many toy buyers dipped their toes in the water and ran like mad when the product was returned.

The buyers left most ranges alone during 1981 but having been convinced of the quality of ranges such as Corgi (now manufactured in Japan) have once again stocked in depth. A recharger unit and rechargable batteries are recommended.

Programmable vehicles have not suffered from the same quality aspects. Unfortunately the number of items available is very few.

Best Buys in this category are: **VW Turbo Rally Car by Corgi** a realistic model with digital proportional steering. It has five separate functions — forward, reverse, turn left, turn right and stop and costs between £33 and £40.

The Honda Superbike by Corgi is another realistic model with detachable rider; proportional steering with transmitter. Engine revving and running noises. Functions — forward, turn left, turn right and stop. Between £26 and £32.

Bigtrak by Milton Bradley must be the best known of all electronic vehicles, having appeared on many television programmes that are concerned with the famous chip.

It can be programmed to travel forwards, backwards, left, right, turn, spin or fire it's photon cannon.

Bought separately, the Bigtrak Transporter can be linked to the vehicle and programmed to haul loads and dump them on command.

Bigtrak is priced between £27 and £40 and the transporter costs from £14 to £20.



Milton Bradley's Bigtrak

Electronic Toys that relied on the famous "chip" were first introduced to the British Toy Trade in the Autumn of 1978.

Since then, we have seen four different generations come and go — some hugely successful, the majority completely the opposite. There have been hand-held games, table top games and most recently credit card size pocket games.

Whilst these have been introduced, throughout the traditional items have remained and I suppose could now be called staple games.

This has of course affected the toy industry and sales of electric train sets and motor racing sets have suffered, in fact collapsed. Also traditional games have suffered as electronic toys (not including television games) have taken over 10% of the actual toy sales.

What do you look for when buying an electronic toy?

Well firstly, as with television games and cartridges, there is game play. Also, and probably most important, there must be a good back-up by the manufacturer/importer, such as after-sales service.

Let's look at the varying types of electronic toys. There are mini-arcade games (both hand-held and table top versions), basic family challenge games, watches incorporating games, vehicles — radio controlled and programmable and learning aids basically for the younger child.

FAMILY FUN

The area of family challenge games is most confusing. You have items that were introduced in the first year of electronic toys and remain strong sellers as they are now regarded as staples.

On the other hand you have the 'gimmicky' items that arrive with a lot of bally hoo and that is all that can ever be said of them — they have 'died' just as quickly as they arrived.

A common fallacy with toy manufacturers is that if you change a highly successful line and introduce either an up-market or down-market equivalent, success is guaranteed. This has also happened to basic electronic family/challenge games.

The prize winner was Computer Perfection. Perfection as a standard shape sorter game has been a huge success for the last six years. Computer Perfection was added to the range in the US in 1979 and in the UK in 1980 and played basically the same way but electronically. Unfortunately the item lasted only two years in America and was finished (if it ever started!) after one year in the UK.

One exception has been Computer Battleships, which was accepted as the first ever electronic game in the UK in 1978 and has sold well ever since. When you think that the standard game still costs only around £7 and the electronic version is around £30-£35 it makes you wonder.

Best buys here are, the **Simon Family by Milton Bradley.** Simon was one of the earliest items onto the market place. It was followed by Super Simon and Pocket Simon. All three are still available and make up a most compact family range. The idea of the game is to repeat after 'Simon' (as in the child's game Simon Says) the colour sequences as quickly as possible. If you are correct the lights and sounds go faster, if you are wrong Simon blows a raspberry and it's back to square one.

Super Simon includes several variations and costs between £30 and £40; Simon, between £18 and £30; and Pocket Simon £11 to £20.



Pocket Simon

Dark Tower is the most recent title in Milton Bradley's electronic range. It is more than just a game — it's an experience. Record your moves on the computerised control centre as you enter this exciting world of fantasy. First to travel around the board and storm the Dark Tower is the winner. Price, between £29 and £40.

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ORIC-1
ORIC-1™
TIMELESS TECHNOLOGY FROM ORIC PRODUCTS INTERNATIONAL

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Master Challenge by Peter Pan is an electronic quiz. Plug the Master Challenge computer into the quiz folder and dial any of the 1001 questions. Select your answer from one of four alternatives and the computer will tell you if you are right or wrong. It comes complete with cartridge number 1 with 1001 general knowledge questions and costs between £14 and £20 while Cartridge Quiz books are priced between £3.50 and £6.

Computer Battleship by Milton Bradley was the first electronic game brought into the UK. This is a game with 'live' action and sound. Hear the hunting of the sonar, the whistling of your missiles and the explosion of a direct hit. Claim victory with three 'whoops' on your destroyer's siren. Price between £24 and £40.

TABLE-TOPPERS

In the beginning there were the hand-held games. Initial sales were tremendous but as all manufacturers, especially those in the Far East, jumped into this market there was tremendous overproduction and 'dumping' occurred, killing the market more-or-less overnight. The sport orientated items were never a huge success and retailers, in an effort to reduce stocks, discontinued the sports lines, this made the other items look well overpriced.

The hand-held game was followed by the table-top version, firstly space war items and then arcade games in a reduced form. At the same time the miniature pocket games (credit card size and calculator size) entered the market, although once again we are going the way of hand-held with a lot of poor quality Far Eastern items pouring into the country.

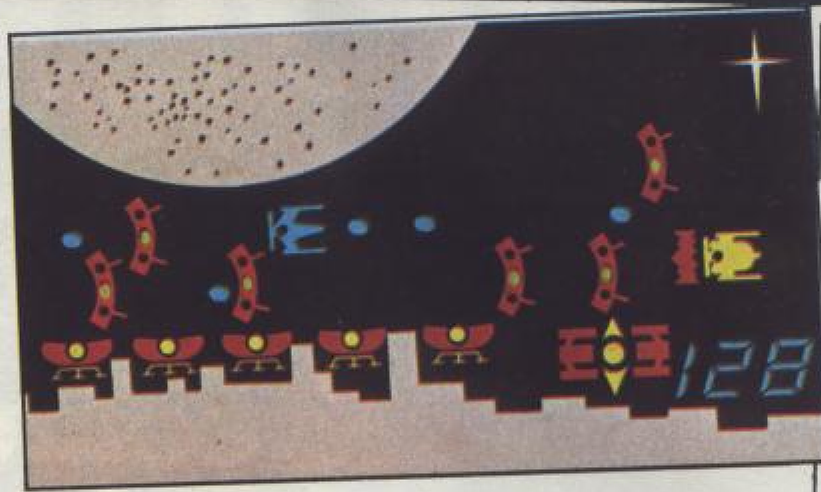
Make sure the graphics are good (as television games cartridges) and the sound reproduction excellent. Games with varying skill levels are obviously better and the games that can be played using a mains adapter are the most sensible (batteries are expensive and these games "eat" them).

When buying, be careful, make sure the bargain has all the above, as the cheap imports that have been dumped very rarely offer the facilities mentioned.

Among the best buys in this field are: **Astro Wars by Grandstand.** A table top game featuring on-screen colour with a special magnifying effect. Five lines of action with multi-coloured invaders and futuristic sounds just like the real arcade game. It has four levels of play and was voted best new toy of 1981 by the National Association of Toy Retailers. It costs between £22 and £30.

Taking you back in time is **Caveman by Grandstand.** A table-top game with multi-coloured display. Control the caveman stealing eggs from the dinosaur, whilst avoiding his attack, features include dive bombing primitive birds, an axe attack, a volcano eruption and a fire breathing monster. Two levels of play and four lives, priced between £19 and £29.





Scramble

Scramble by Grandstand is an obvious follow-up to Astro Wars. It is based on the popular arcade game of the same name, and has a multi-coloured display with new exciting sound effects. Four separate phases including a meteorite attack, a space squadron attack, flight through the black hole and a base station attack. Costs from £22 to £30.

Defender by Entex is a hand-held version of the Williams arcade game that has long been an arcade favourite.

Defend your planet against many alien craft in a fast-moving rocket ship. It features asteroids, aliens, humanoids and a variety of hazards as well as twin radar spotter screens, multi-colour display and sound effects. Price between £27 and £35.

Munchman by Grandstand is a table top game with multi-coloured display. As with the hugely successful PacMan game you attack the monsters by eating the power food to score points. Two skill levels and costing between £18 and £24.

PacMan 2 by Entex is the hand-held version. A multi-coloured game of strategy and tactical pursuit. Six skill levels in the single player mode with two skill levels in the two player mode. It costs between £24 and £30.

Galaxy Invader 1000 by Computer Games Limited (C.G.L.) is a hand-held game with three skill levels and great sound effects — score extra points shooting down the U.F.O. Price between £18 and £21.

PLAY SCHOOL

Electronic technology is now used in so many areas that it is no surprise at all that the expansion of the 'chip' in pre-school toys has occurred.

From a few years ago, when Texas Instruments entered the market, the idea of a small child learning from an electronic aid has become more-or-less standard. The early days of an American voice have practically disappeared and Milton Bradley have now entered the market.

The educational toy is now being used in many schools and is as much fun for the adult as the child.

Among the **Best Buys** are: **Speak and Spell by Texas Instruments.** The first of the 'talking, toys, it also has built-in extra games. It is a fantastic learning aid with computer brain and electronic voice. Pronounces words letter by letter — rewarding when right, correcting when wrong. Priced between £33 and £43.

Little Professor by Texas Instruments is a child's first electronic learning aid. Now up-dated to a LCD display, it has thousands of maths problems at four levels of difficulty. Priced between £9 and £12.

Major Morgan by Playskool is Milton Bradley's first entry into the pre-school electronic market. To play simp-

SANTA'S CHOICE

ly insert one of the song cards and touch the electronic keyboard according to the letters, numbers, colours or shapes shown. It is priced between £7 and £12.

Maximus by Playskool is the computer companion for learning and fun. Green "tick" lights up for correct answer, red "cross" with a buzz when wrong. Plays tune when all correct. Four different activities — spelling, match-ups, counting and music. It costs between £8 and £14.

You will notice from the wide range of price gaps, it pays you to shop around and find the best price.

[redacted]

JUST WATCH IT!

A deluge of games for the Atari VCS system is ready to descend on to the UK market.

They are manufactured by a host of new independent US software houses, which numbered 17 at the last count.

While the prospect of all these new games is an exciting one, it is necessary to add a word of warning. Not all of the games advertised have been properly converted to the UK market.

The American television system is not compatible with the British system and any cartridges produced over the Atlantic have to be converted.

Otherwise they will not offer as accurate and clearly defined graphics as they should, they may be slower and the colour usually suffers — in extreme cases, the cartridge will not produce colour at all.

The normal process is for an American company to make a deal with a UK distributor to release his cartridges over here. These are then converted and soon find there way into the shops.

Among the ranges currently out over here are: Parker, distributed by Palitoy; Imagic, distributed by Adam Imports; Appollo, distributed by Vulcan Electronics and Activision, by Computer Games Limited.

But cartridges that are available in the US can still be shipped over unconverted and sold here.

The technical reason why these cartridges are not compatible is due to the different electricity supply standards which apply in the US and in Britain. American TV sets run off 70 Hertz while British sets run off of 50 Hertz.

This causes cartridges which have not been modified to roll continuously as if the TV set were faulty.

In order to correct this cartridges need to be fitted with a stabilisation circuit to hold the picture stable.

Questions to ask your dealer before you buy are: "Is it a British standard PAL cartridge" or simply, "Is it compatible with British television sets".

Best of all ask to see the game actually working before you purchase the cassette.

System X is a hot topic in TV gaming. Atari is still not telling its public much about the machine which is due to supersede the incredibly successful Atari VCS.

We have managed to glean a picture (right) and a few facts about this machine which has earned itself the nickname "the Super-game".

[redacted]

Remote control joysticks are one feature on the new system and it will also have a tracker-ball control.

There will be 12 cartridges in the initial range, including sports and familiar arcade titles and the graphics will be similar in detail to the cartridges produced for the 400/800 computers.

Among the graphical frills will be clouds of dust produced by runners in the sports cartridges. And it is rumoured that there will be a plug-in attachment which will allow the system to run existing Atari VCS cartridges.

Beating the Atari System X to our selves will be Colecovision's new TV games centre, due out early in 1983.

It is being marketed in this country by Ideal and is promising a big improvement in games centre graphics.





WE'RE PLAYING FOR TIME . . .

Pocket size game-watches are coming down in price and there will be an abundance to choose from this Christmas.

A conservative estimate puts the number at 80 different varieties in numerous ranges. These can look very impressive with all sorts of wierd creatures inhabiting the screen. And some of the recent batches even have storylines to back them up, like Hanimex's Sleeping Beauty for example.

But, the important thing to look for is that elusive addictive quality which prevents you from picking the game up "for just two minutes". Simple games usually work the best in this format.

Among the best games are: Popeye from C.G.L. which sets you the task of catching articles thrown by Olive Oyl, while Bluto tries to knock you into the harbour. Price about £19.95.

[redacted]

SPACE WARP

A recent addition to the pocket l.c.d. games with time facility is the watch with game facility.

Watches have always suffered from a high reject rate and obviously with the game facility added, rejection rates have increased. Watches are now much bulkier but sales have gone well due to the novelty of the item.

Again, space games are among the most popular with game watch fans.
Ones to watch out for here are: **Game Time by C.G.L.** The Space Invader type is by far the best seller and can be played with or without sound effects on the l.c.d. playing area. Cost, between £20 and £30.

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Continued from page 89

OPENING MOVE

What questions should you ask when buying a dedicated chess machine?

Most important is speed of response, if you want a machine which plays as fast as you do; you will find it irritating to sit and watch it struggling over an obvious move.

Ask for a shop demonstration, not just a talk through the instruction booklet; try and find out how the machine responds to an opening variation and how easy it is to set up a position on the board.

For models destined to spend long periods away from power points, ask how long the batteries last — two hours is of little use to anyone. Examine the display or the pieces to see if you can distinguish them easily, find out about a guarantee — two years is what you should expect for the powerful machines. Remember these machines still have a 2-4% failure rate.

If book openings are important to you — if you take chess seriously they will be — ask how many the computer can play and see if you can make anything of the instruction manual. Then start checking the price.

CHESS CHAMPS. . .

Does the computer owner still have any use for a dedicated chess-playing machine?

With some extremely powerful chess programs for home computers being produced in ever-decreasing memory, it is all too easy for the computer owning chess player to scoff at the more-expensive dedicated machines.

Sargon II may be more than a match for most of us but Terry Pratt looks at the current state-of-the-art of consumer chess machines.

The **Scisys Mark VI Chess Champion** came into the country last month boasting a brand new program which excells at Sicilian Defence and plays a tight game with the emphasis on strong pawn centres.

At £210 for the machine with LCD chess board display, or another £125 if you want to attach it to a sensory board, it does not compare favourably with a Sargon II program on your home computer.

It would beat **Sargon II** in a straight contest, although — unlike its Mark V predecessor — it has not been specially designed to defeat other machines.

It was one of those inevitable ironies of the computer age that machines designed to play against humans first had to prove themselves against other machines. The Mark V did this by going out of "book" as soon as possible, and so throwing its opponent back on to its own resources early in the game.

"Book" openings are one of the main advantages of the dedicated chess machine, over its home computer rivals. All the top class chess machines have a huge repertoire of stored book openings.

As casual chess enthusiasts are more likely to study the game than actually playing it, they usually have a strong knowledge of the openings that top players use and how to progress to a reasonably even middle game in many of them.

They invariably have developed their own favourites and a computer which will take them down these familiar paths, responding quickly because it is just pulling moves out of memory, will enable the player to explore and examine his favourite openings further.

One of the Scisys' main rivals at this level is the Sensory 9, from the challenger range, distributed over here by Computer Games Limited.

It accepts a library of modules, programmed to keep it up to date with the latest innovations of computer chess and store various book openings — the first two cartridges gives an effective 27,000 opening moves for its owner. The machine costs £149.95 and its cartridges cost from £59.95.

Sounds like a good idea when you consider how chess programming is constantly been updated and experimented on. Unfortunately, although the programmers themselves are naturally excited by tiny improvements in the computer's play, the benefit as seen from the usual chess player's point of view are negligible. The fact is that computers, without taking in ordinate amounts of time, or being attached to walls of mainframe memory, are still groping just below top club player standard and will be for some time.

What other benefits does the dedicated machine have? Well a quick look through its extras will show a few. These include: Analysis, where it gives your best move and prints out a numerical comment on the state of the game; Comment, where it will tell you dis-arming things like "mate-in-four"; Draw, it may accept your offer of a draw; in problem mode it will sift through the combinations for the best moves; it can keep 12 simultaneous games in memory to play.

It can be educational. The Scisys comes with a booklet size set of instructions and Vulcan Electronics, which markets the game in the UK claim it is very educational. It is. In auto mode it will happily play itself and display its profound knowledge of openings with a tendency to veer towards the Sicilian.



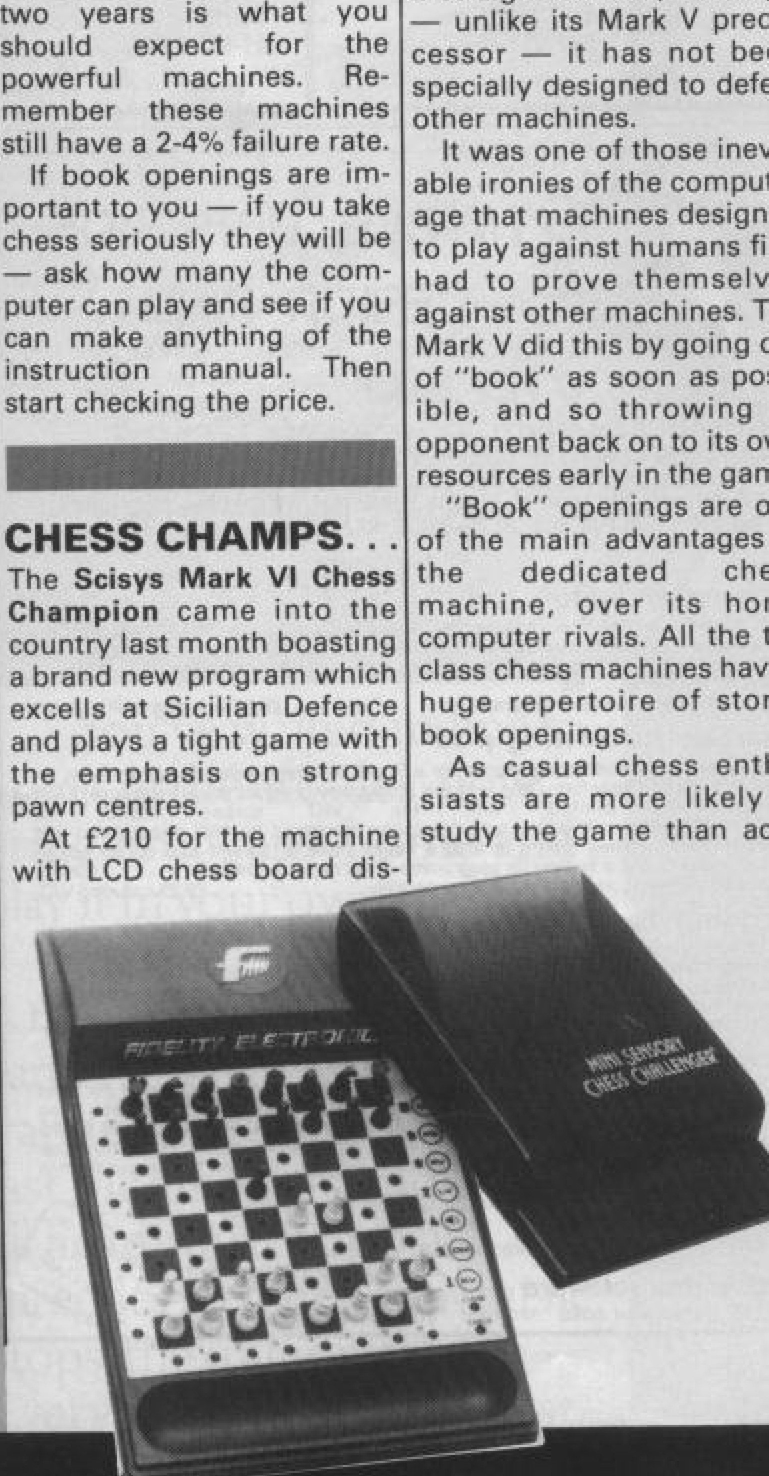
Computer Games' **Voice Sensory Challenger** costs £199.95 and will also keep you aware of what is going on with phrases like: "Your move" and "Mate in two" which can be irritating and is probably the closest any chess machine will ever get to gamesmanship.

Of course these models plug into the mains and are hardly portable in the same way as the old travelling chess sets.

The **Hanimex** costs £30 and is a marvellous buy for the keen chess beginner.

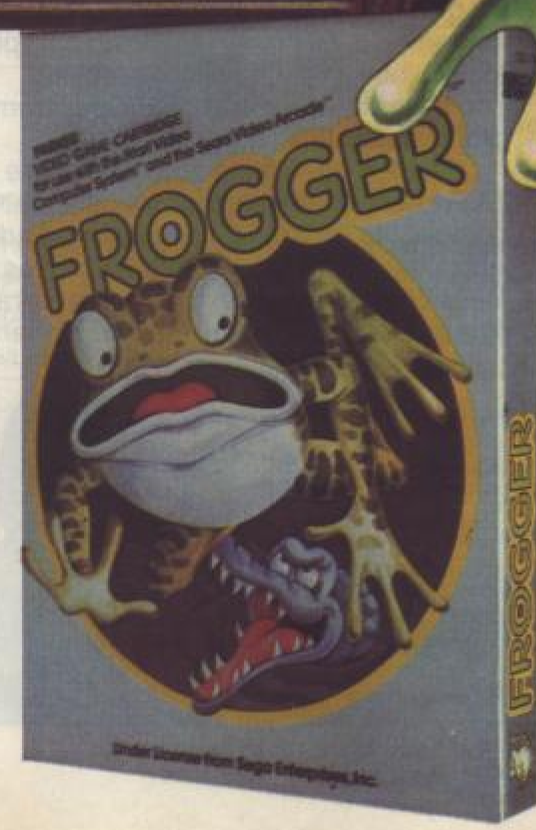
Also its batteries last a very impressive 50 hours.

The **Mini-Sensory Chess Challenger** costs £49.95 and looks just like the old travelling sets, the **Scisis Executive** costs £69.95.



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Yet the price of the Spectrum 16K is an amazing £125! Even the popular 48K version costs only £175!

You may decide to begin with the 16K version. If so, you can still return it later for an upgrade. The cost? Around £60.

Ready to use today, easy to expand tomorrow

Your ZX Spectrum comes with a mains adaptor and all the necessary leads to connect to most cassette recorders and TVs (colour or black and white).

Employing Sinclair BASIC (now used in over 500,000 computers worldwide) the ZX Spectrum comes complete with two manuals which together represent a detailed course in BASIC programming. Whether you're a beginner or a competent programmer, you'll find them both of immense help. Depending on your computer experience, you'll quickly be moving into the colourful world of ZX Spectrum professional-level computing.

There's no need to stop there. The ZX Printer–available now–is fully compatible with the ZX Spectrum. And later this year there will be Microdrives for massive amounts of extra on-line storage, plus an RS232/network interface board.



Key features of the Sinclair ZX Spectrum

- Full colour–8 colours each for foreground, background and border, plus flashing and brightness-intensity control.
- Sound–BEEP command with variable pitch and duration.
- Massive RAM–16K or 48K.
- Full-size moving-key keyboard–all keys at normal typewriter pitch, with repeat facility on each key.
- High-resolution–256 dots horizontally x 192 vertically, each individually addressable for true high-resolution graphics.
- ASCII character set–with upper- and lower-case characters.
- Teletext-compatible–user software can generate 40 characters per line or other settings.
- High speed LOAD & SAVE–16K in 100 seconds via cassette, with VERIFY & MERGE for programs and separate data files.
- Sinclair 16K extended BASIC–incorporating unique 'one-touch' keyword entry, syntax check, and report codes.

rum



The ZX Printer – available now

Designed exclusively for use with the Sinclair ZX range of computers, the printer offers ZX Spectrum owners the full ASCII character set – including lower-case characters and high-resolution graphics.

A special feature is COPY which prints out exactly what is on the whole TV screen without the need for further instructions. Printing speed is 50 characters per second, with 32 characters per line and 9 lines per vertical inch.

The ZX Printer connects to the rear of your ZX Spectrum. A roll of paper (65ft long and 4in wide) is supplied, along with full instructions. Further supplies of paper are available in packs of five rolls.



The ZX Microdrive – coming soon

The new Microdrives, designed especially for the ZX Spectrum, are set to change the face of personal computing.

Each Microdrive is capable of holding up to 100K bytes using a single interchangeable microfloppy.

The transfer rate is 16K bytes per second, with average access time of 3.5 seconds. And you'll be able to connect up to 8 ZX Microdrives to your ZX Spectrum.

All the BASIC commands required for the Microdrives are included on the Spectrum.

A remarkable breakthrough at a remarkable price. The Microdrives are available later this year, for around £50.



ZX Spectrum software on cassettes – available now

The first 21 software cassettes are now available directly from Sinclair. Produced by ICL and Psion, subjects include games, education, and business/household management. Galactic Invasion...Flight Simulation...Chess... History...Inventions...VU-CALC...VU-3D ...47 programs in all. There's something for everyone, and they all make full use of the Spectrum's colour, sound and graphics capabilities. You'll receive a detailed catalogue with your Spectrum.

RS232/network interface board

This interface, available later this year, will enable you to connect your ZX Spectrum to a whole host of printers, terminals and other computers.

The potential is enormous. And the astonishingly low price of only £20 is possible only because the operating systems are already designed into the ROM.

sinclair

Sinclair Research Ltd, Stanhope Road, Camberley, Surrey GU15 3PS. Tel: Camberley (0276) 685311.

How to order your ZX Spectrum

BY PHONE – Access, Barclaycard or Trustcard holders can call 01-200 0200 for personal attention 24 hours a day, every day. BY FREEPOST – use the no-stamp needed coupon below. You can pay by cheque, postal order, Barclaycard, Access or Trustcard.

EITHER WAY – please allow up to 28 days for delivery. And there's a 14-day money-back option, of course. We want you to be satisfied beyond doubt – and we have no doubt that you will be.

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	Sinclair ZX Printer	27	59.95	
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	Postage and packing: orders under £100	28	2.95	
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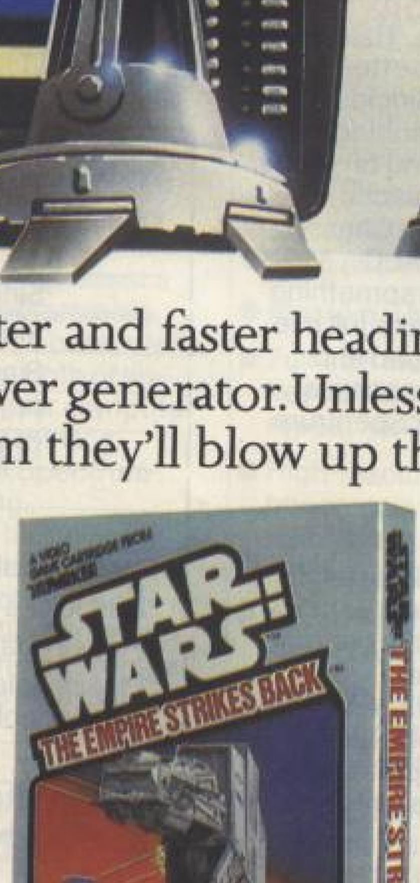


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It's up to you to strike back while there's still time.

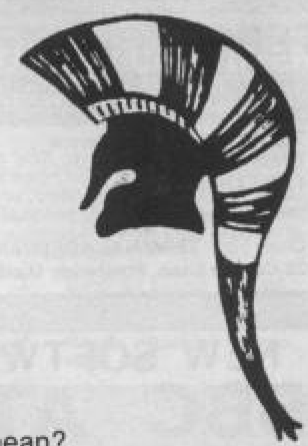
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Take home finance packages one step further and you have a home economy game for prime ministers to try their hand at.

In Great Britain Ltd. you are cast as the heroine of the tennis club — that's right — our very own first lady — Prime Minister — Mrs Margaret Thatcher.

You have just five years until the next general election in which time you must convince the fickle electorate that you will be the best bet for the following five years.

The computer provides information on the current rates of inflation, unemployment, dollar exchange, and the balance of payments, as well as details of current wholesale prices, average income and the retail price index.

You have a number of policies at your disposal as you wrestle with the gloomy downward spiral in the country's economic performance. Various forms of taxation can be tinkered with in an attempt to reduce inflation and unemployment.

As if the country's economic problems were not enough for the hero of our game to worry about, there are also a number of unforeseen catastrophes which could upset public opinion anytime.

After five budgets, or before, if things have gone disastrously wrong, a general election take place. Your success in this will depend on your efforts previously. If you win, you get to run the country for a further five years — although you may look on this as more of a punishment than a prize.

The game may be good training for future Chancellors of the Exchequer or to shut-up that drunk in the pub who always claims that the country's problems would be over if the government would abolish all taxes, but I found it far from addictive and somewhat simplistic. I feel generally that the game has little appeal.

Running on a BBC Model B, G.B. Ltd. is from Berkshire-based S. W. Hessell Software and costs £5.95.

- **Getting started 8**
- **Value 5**
- **Playability 5**

HUNTING PINK ELEPHANTS . . .

SHOOTING ARCADE

It's all the fun of the fair in this amusing new arcade type game for the 16K Atari computers.

The idea of Shooting Arcade is quite simple — all you have to do is shoot all the targets before your ammunition runs out.

At the start of the game, you are confronted with six rows of different targets which criss-cross in front of you.

The first row consists of a row of pink elephants which stomp their way across the screen. Above them is a row of waddling ducks opening and closing their beaks. Next is a row of hopping bunny rabbits.

After this things begin to get a little more difficult with revolving faces changing from happy to sad. Hit a sad one and another bunny rabbit will appear.

The next line is a row of targets which when hit will reverse the flow of fairground invaders. The top row of diamonds are valuable targets worth bonus bullets.

On clearing the entire screen, the player is confronted by a huge bear (wearing a hat) which dodges from left to right when hit.

The game uses high resolution colour graphics making good use of the machine's colour and graphical capabilities.

Despite the game's excellent graphics I found the game rather unimaginative and the sound effects were particularly disappointing.

Complete with six skill levels Shooting Arcade is a reasonable, though far-from-outstanding version of this type of game.

The game runs on an Atari 400 and is available from London based Computer Magic at £20.50.

- **Getting started 9**
- **Value 4**
- **Playability 4**

Illustration: Terry Rogers

NEVER MIND THE QUALITY . . .

GAMES PACK 3

If you think that four games on one side of a cassette tape sounds too good to be true then you are proved right by Games Pack 3.

Mind The Meteors challenges you to steer your spaceship safely through a meteor storm. Trouble is the meteors are not meteors at all but simply a number of stationary asterisks dotted around a rectangle which occupies exactly half of the screen.

The spaceship is pretty unimpressive too. Just a tiny little arrow. This game was so easy I mastered it on my fifth go and found it so boring from then on that I quickly loaded the second game on the tape — Daylight Robbery — to see if it was any better.

Alas no. The game offers an interesting idea — you have to raid as many safes as you can and get away with the cash — escaping through the maze exit, before the guard can grab you. As with Mind The Meteors the game was spoilt by hopeless graphics. The safes are dollar signs, you are represented by the letter O, the guard by an I, and as with all four games there were no sound effects. This was also a frustratingly slow game to play.

Battleships is a good game, but I did not feel that this computer version was any better than playing the game with a pen and paper. The submarines, destroyers, cruisers, and carriers were all represented by the letters 'S','D','C','A' — a bit disappointing considering the exciting comic-style illustration of a submarine on the cassette inset.

The final game on this cassette was Invisible Invader which enables you to draw long lines of asterisks across the screen. Again the graphics are disappointing — your "spacecraft" is an asterisk. The "Invader" as the title suggests is invisible, which is just as well really, for if it had been visible I feel sure it would have been an asterisk too.

Games 3 is just one of a series of four games packs from ICL for the Sinclair Spectrum. The cassette is available from larger branches of W. H. Smith at £4.95. If the others are all like this then games packs one to four certainly won't be on my shopping list this Christmas.

- **Getting started 7.**
- **Value 2.**
- **Playability 1.**

BEWILDERED, BOTHERED, AND BAFFLED

MASTERMIND

You would think wouldn't you that a well known TV quiz programme such as Mastermind would convert well to a computer game.

Strange then that Mastermind — the latest offering from Commodore — should be such a poor offering.

Here are just a couple of examples.

Question: What have A.AB. and O in common. If you think the answer is types of blood or blood type you would be wrong. The answer is blood types. Therefore the answer given by yours truly was wrong according to the book of Commodore.

I wouldn't mind if the thing was at least consistent, but a two word answer was given as wrong if the answer in the data base was one word, ie. Marquis of Queensbury: wrong. Queensbury: right. Fly Fishing: wrong. Fishing; right.

But just when you think you have cracked it and answer Weismuller for the first Tarzan you find you have been double crossed and the correct answer is Johnny Weismuller.



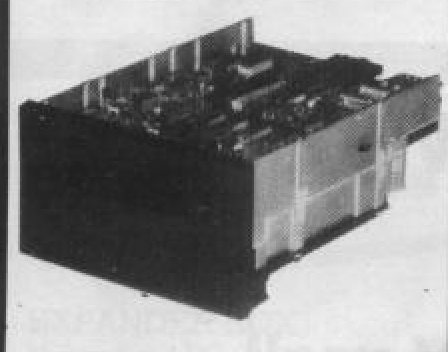
Illustration: Dorian Cross

I am not sure how many questions there are on each data tape but after a while life gets boring seeing the same questions appear time and time again when picked at random.

BBC Mastermind runs on a Vic 20 with a 8K or 16K ram pack expansion. It is in the shops now at £9.95 for the basic package plus £1.99 for specialist subject tapes.

- **Getting started 7**
- **Value 3**
- **Playability 2**

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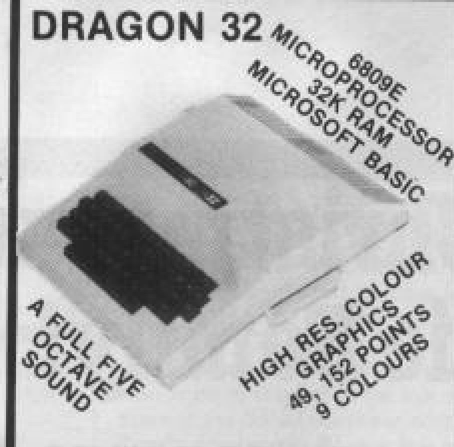
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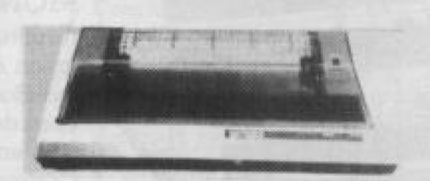
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*Escape 16K cassette .... £6 + VAT = £6.90
*Mansion Adventure 16K cassette £6 + VAT = £6.90

VIC20 Software by Automated Simulations
*Ricochet (Nov) cassette . £11 + VAT = £12.65
*King Arthur's Heir (Nov) cassette £17 + VAT = £19.55

Atari Software by Sirius
*Snake Byte 48K Disk ..... £17 + VAT = £19.55
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*Tanktics 48K Disk .... £15 + VAT = £17.25
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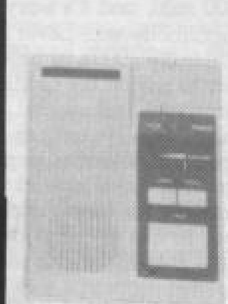
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This is a short range cordless telephone for use within the house or from the garden. You can receive and make calls from the hand set. Range approx. 600 feet.
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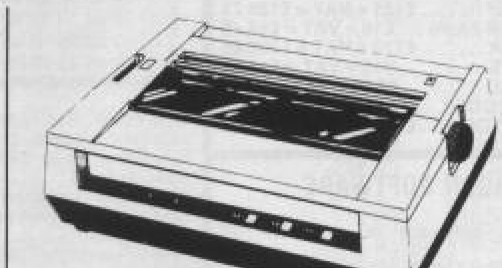
So, if you are not lucky enough to own a Genie I, or if you have a less powerful small computer and want to upgrade, go along to your local Genie dealer, or phone us for advice. It could be your first step into the enthralling world of microcomputers.



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If you don't want to pay that much for a printer, consider the EG 603. It doesn't match the EG 3085 in certain areas, but you will still get 100 c.p.s. bi-directional, a range of character styles, forward and reverse feed and pin/friction feed, with 96 characters and 64 graphic patterns.
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Beat the dirt, coffee spills and sticky fingers when your computer and monitor are not in use with these top quality black leather covers.

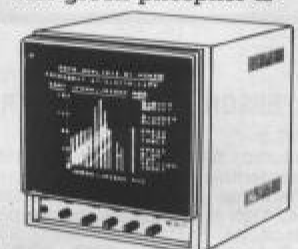
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Available in 9" and 12" sizes, with white, green or amber display, Lowe A.V.T. monitors are sturdy, attractive, easy to operate and feature an easy view screen with smoked anti-glare display filter. Compatible with most popular micros on the market. **From £75 plus VAT.**

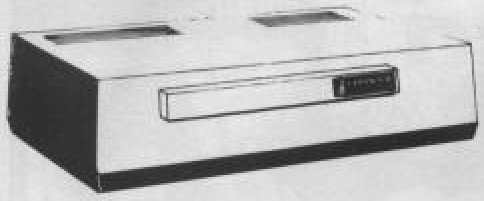
HIGH RESOLUTION GRAPHICS

Increase graphic resolution capabilities on your Genie seventy-three fold with the LE18 HI-RES unit. It offers bit image graphics of 73,728 points, a resolution of 384 x 192, and uses a separate 16K of video memory to achieve its resolution. Graphics are intermixable with text or existing pixtel graphics, and animation, reverse video displays and use of programmable graphic characters are possible. **£86 plus VAT.**

TECHNICAL MANUALS

Full technical details of Genie Hardware (all you ever wanted to know about Genie).

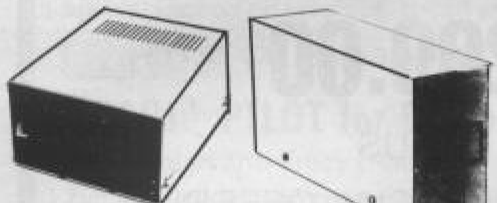
Genie I/II Technical Manual
£10 - No VAT.
Expander and accessories (EG3014)
£10 - No VAT.



EXPANDER BOX

The updated EG 3014 expander box allows for up to four disk drives with optional double density. It connects to a printer, or RS 232 interface, or S100 cards. Not bad value at **£190 plus VAT (16K version) or £200 plus VAT (32K version)**

*The EG 3014 will work with TRS 80 by using the EG 3023 Tandy Adaptor.



DISK DRIVES

If you want fast, reliable program storage, true random access file handling and access to many computer languages, we can meet your needs. The EG 400T provides storage of up to 184320 bytes per floppy disk and comes complete and tested, in a stylish colour matched cabinet. **£220 plus VAT.**

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DOUBLE DENSITY ADAPTOR

Allows the use of standard minidisk drives in double density, with virtually double the storage capacity. The EG 3021 is equally at home in the Genie or TRS-80 expander boxes.

A double density disk operating system will be needed, such as smalLDOS provides. **£72 plus VAT.**

smalLDOS

Powerful, yet reasonably priced, the Genie smalLDOS contains 21 library commands, 7 utilities, LBASIC, disk basic and bags of information, including a reference manual and 40 page beginners guide to disk usage. **£35 plus VAT.**

BUSINESS SOFTWARE

Specifically written for the Genie II computer, with disks and a suite of packages from the renowned house TRIDATA. The suite includes SALES LEDGER, PURCHASE LEDGER, PAYROLL and STOCK CONTROL. Each package is a very reasonable **£175** plus VAT. Full details on request.

EG 3203 TANDY-BASHER

If you are a TANDY user, read on! The EG 3203 is bus converted to allow Genie peripherals to be used with Tandy Model I computers. **£18.40** plus VAT.

(Just in case there might be a few strange souls who want to convert in the opposite direction, there is the 50/40 converter which generates a Tandy compatible 40 way bus from a Genie.) **£34** plus VAT.

FRED MUSIC SYNTHESISER

Beethoven might well roll over at this stereo music synthesiser, it can produce six simultaneous notes over the whole audio range and provide sound effects. FRED comes complete with a software compiler, full instructions and a demo tune. It is simply plugged onto the Genie 50 way bus and has two outputs for an audio amplifier. **£51** plus VAT.

EG 3016 PARALLEL PRINTER INTERFACE

The EG 3016 is a simpler interface allowing a Centronics parallel compatible printer (EG 603, EG 3085) to be connected directly to the Genie keyboard without the need for an expander box. **£38** plus VAT.

BUS EXTENDER

A most useful accessory, allows two bus using devices to be connected simultaneously to the Genie – when using the Hi Res and expander for instance. **£21** plus VAT.

EP1, EP3

Genie I and Genie II have ROMS offering 13.5K BASIC are custom written extensions contained in EPROMs. You can change these as follows:

EP1 Adds all Genie 1 software facilities to other Genies, lower case driver, machine language monitor, renumber facility, keyboard repeat and screen print.

EP3 Has HI-RES driver software with 10 extra HI-RES commands which prevent need to load HI-RES software from tape. All at **£12** plus VAT.

For Video Genie Systems, the LE-19 connects direct to the Genie bus and allows one of these EPROMs to be fitted externally. **£26.50** plus VAT.

SYSTEMS DESK



Even a compact modular computer system like the Genie benefits from being used on a custom designed system desk. The SD1 system desk is designed to accommodate a complete Genie System and has a special upper shelf to support the display monitor at the best level. The desk is flat packed for easy delivery and finished in attractive teak and charcoal colours. **£81.40** plus VAT.

SPECIAL TECHNICAL GENIE HOT – LINE ON 0629 4995

for all your technical advice and service back-up on any aspect of the Genie system direct from the experts'



Colour Genie is the latest piece of personal computer magic from Lowe Electronics. Remarkably compact in design, Colour Genie is a powerful piece of new technology which combines all the best features of the popular Genie 1; 16K RAM, 16K BASIC ROM, and full size typewriter keyboard, with the addition of vivid colour, high resolution graphics, 3 channel sound and 40 x 24 screen format – a new dimension in home computing!

Put one in your living room, connect it to a standard colour T.V., and you will be amazed at the worlds that open up for you and your family!

For children and adults, Colour Genie provides an ideal introduction to computer programming. If you fancy a spot of intergalactic travel, or a battle for the planets, Genie will lay on the transport. When you get tired of the kids beating you at Space Invaders, you can always turn their attention to schoolwork. Genie makes that fun too! You can learn typing, a foreign language, or simply keep your household accounts in order.

Of course, Colour Genie is only one of a number of home computers you could consider buying; however, the £199 price tag gets rid of some of the opposition, as do the 64 present and 128 programmable graphic characters! 8 exciting colours leave a few more standing, and four function keys with a built in power supply put Colour Genie way out in front!

ACCESSORIES

Golour Genie can be supplemented by a large range of optional extras. There is an attractive matching cassette recorder on which to store your own programs, or play pre-recorded software. Joysticks are available for popular video games, and a position-detecting light pen to heighten your colour-graphic creations. If you want to put your machine to work in your business, it can be expanded by a 16K RAM card, and connected to a guality matrix printer via the printer interface and cable.

SOFTWARE

Colour Genie uses a Z80 central processing unit, and is fully programmable in Microsoft colour BASIC, the most popular home computer language in the Western World!

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Colour Genie contains a FULL MUSIC SYNTHESISER, which will generate a remarkable range of musical sounds through your T.V. speaker, in a variety of pre-settable tempos.

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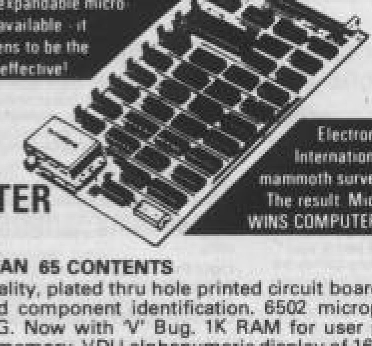
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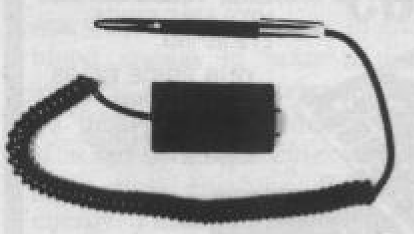
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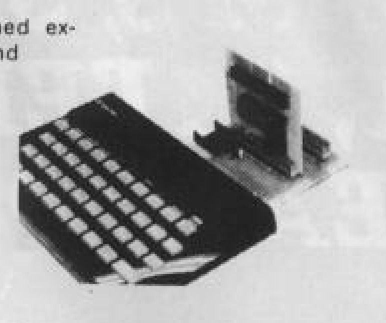
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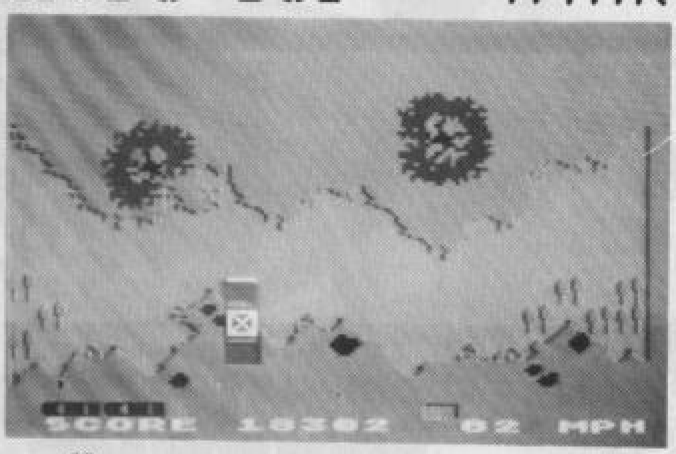
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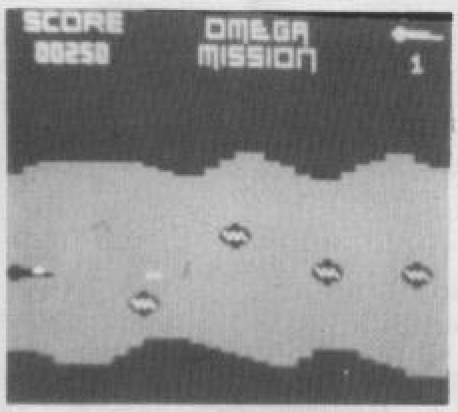
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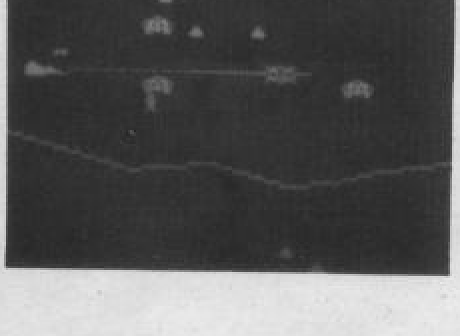


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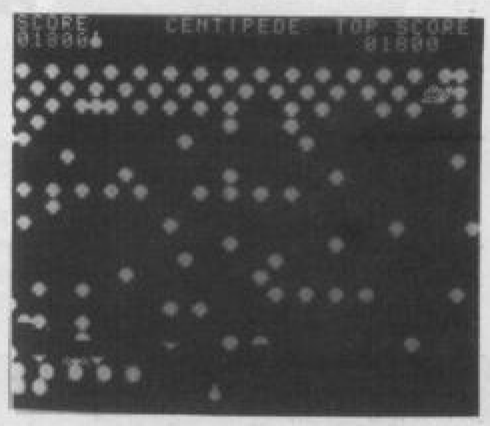


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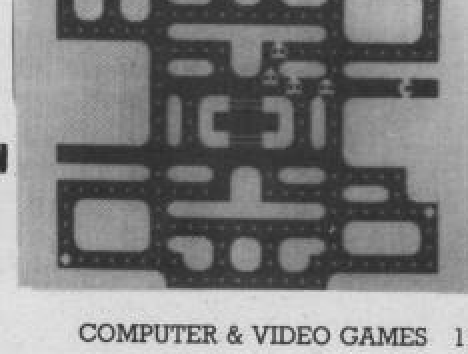


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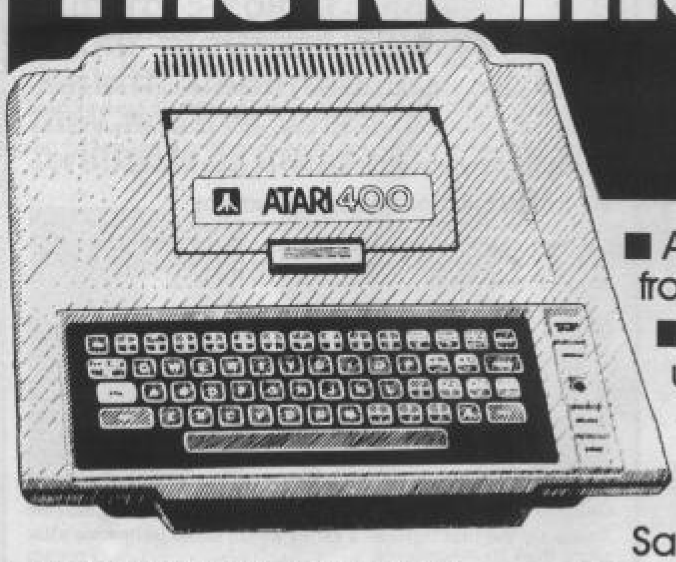
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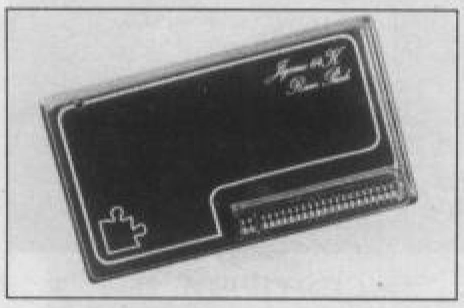
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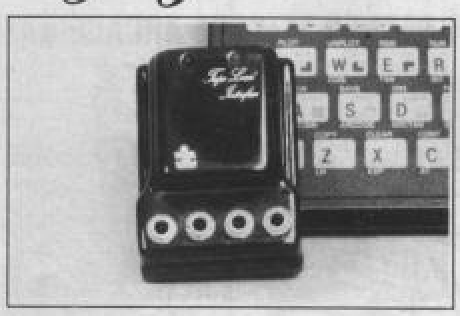
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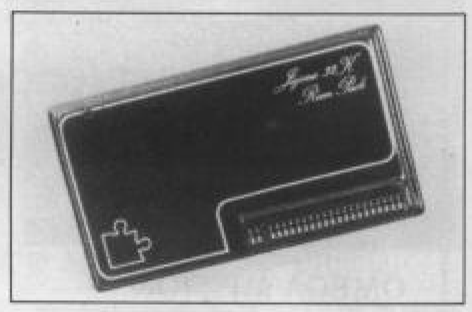
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